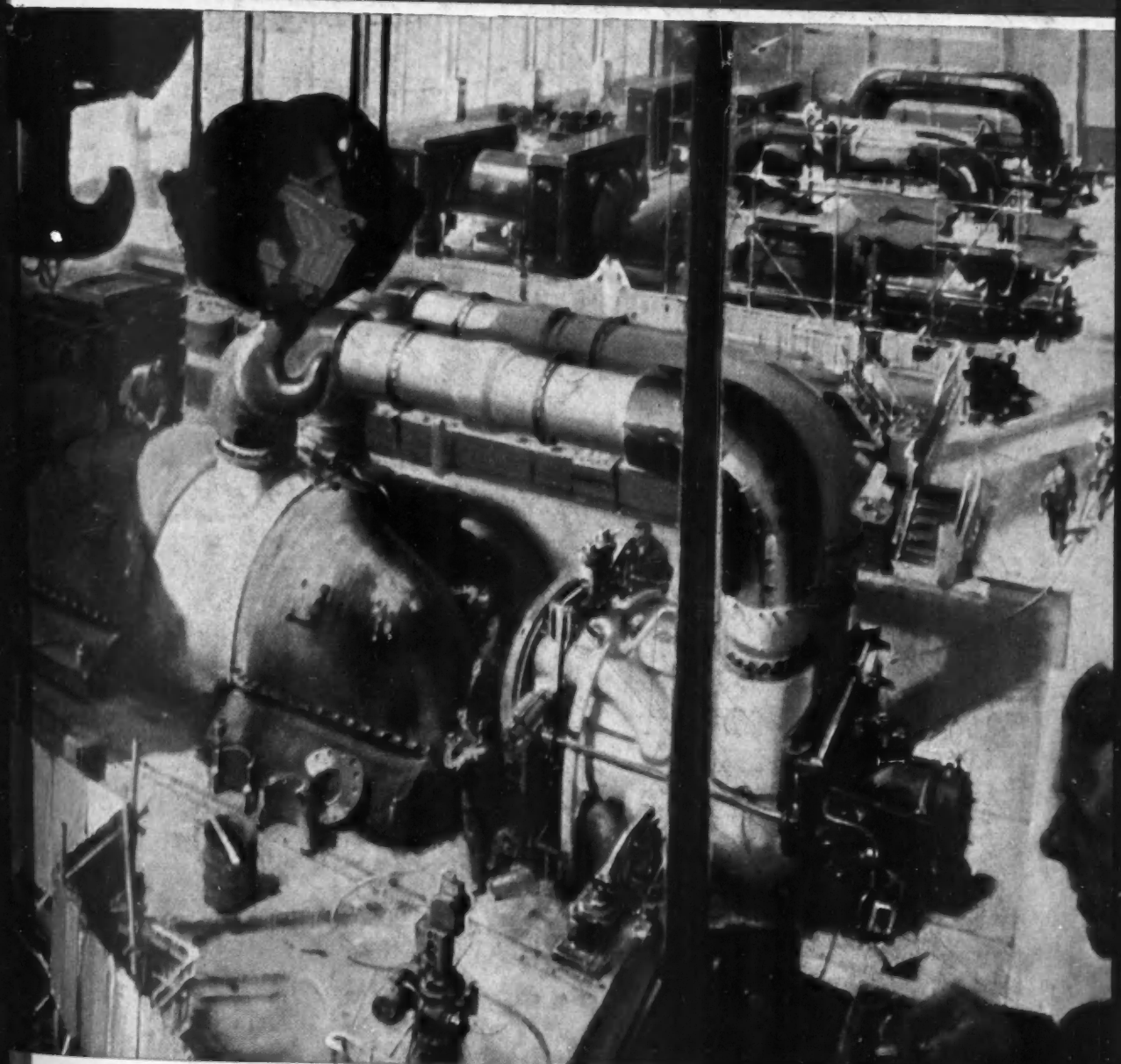
ELECTRICAL REVIEW

6213

16 MAY 1958

JUN 4 1958

PRICE 1s 6d



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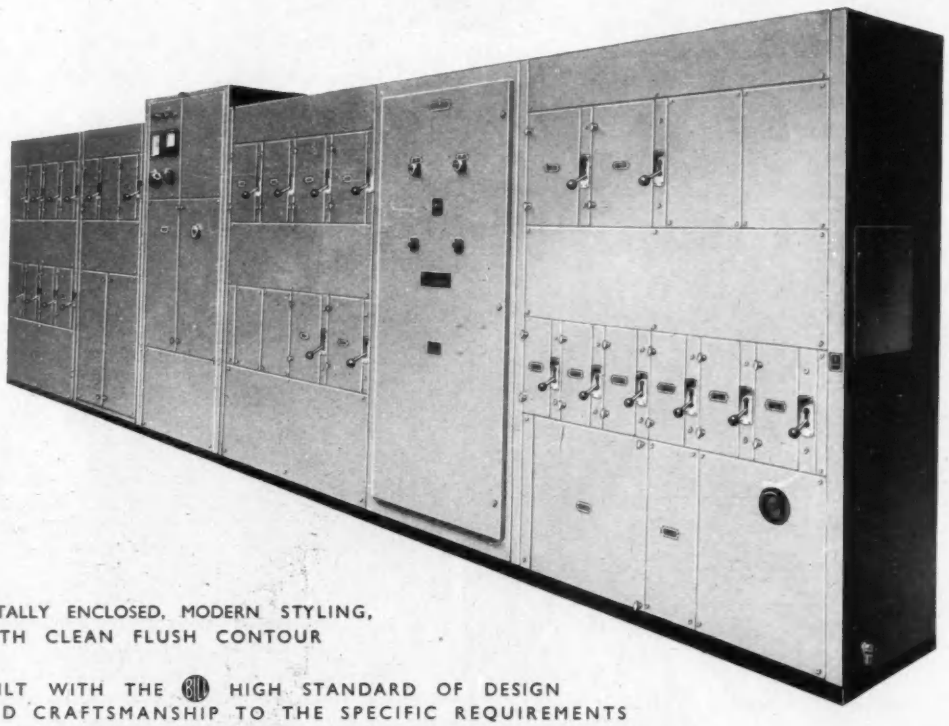

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One of the many 'Auto-Memota' starters and isolators in St. Margaret's Mills, Leicester.

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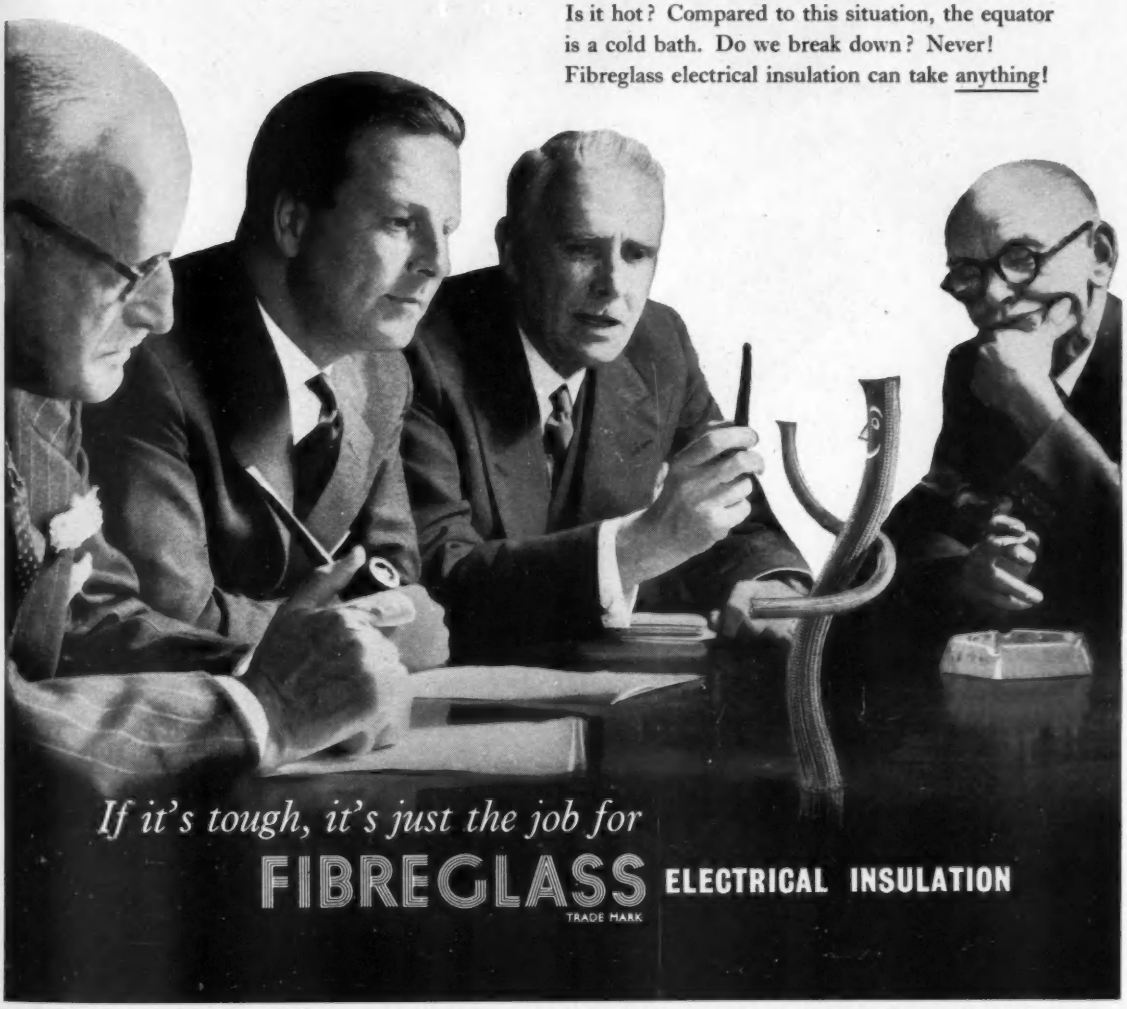
"Ever thought of coal-crushing as a career?"

they asked us.

"Er . . . no" we confessed—not realising that anyone crushed coal on purpose.
"A job of National Importance" they tempted us.
"O.K., we'll take it," we agreed.
"Don't run away with fancy ideas," they warned, "your job will be insulating the electric motors that operate the plant."
"A pushover," we replied recklessly.
"If you don't mind working entirely without ventilation" they said "totally enclosed by welded-in sheet steel covers. Gets kind of hot"—they added nastily.
"Just our cup of tea," we gulped—and took the job.
Years later—meaning now—we are still at it.
Is it hot? Compared to this situation, the equator is a cold bath. Do we break down? Never!
Fibreglass electrical insulation can take anything!



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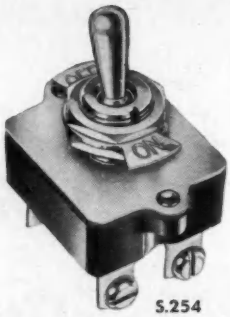
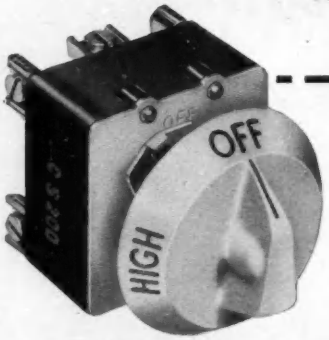
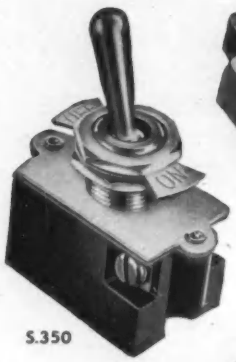


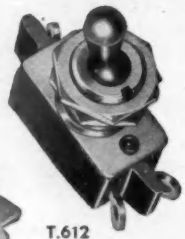
S.254

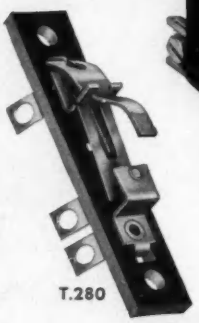


C.S.200



S.350


T.612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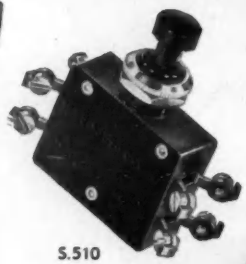
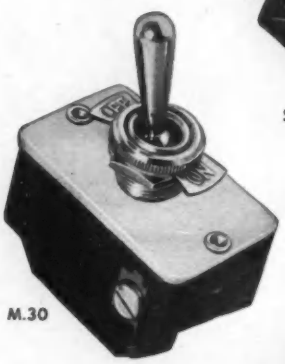
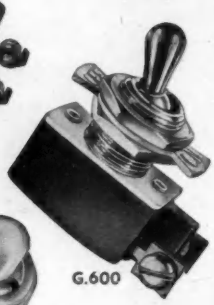
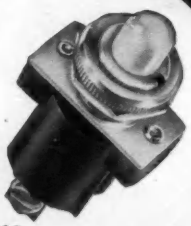
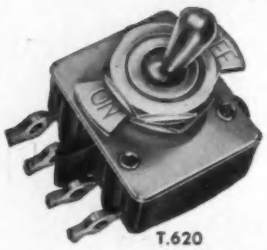

S.510



M.30


G.600


S.930



T.620

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T.280	Sensitive Snap Action Switch
T.612	3-AMP single pole change-over
S.350	5-AMP Toggle Switch
S.510	Double pole biased change-over
M.30	10-AMP Toggle Switch
G.600	3-AMP Toggle Switch
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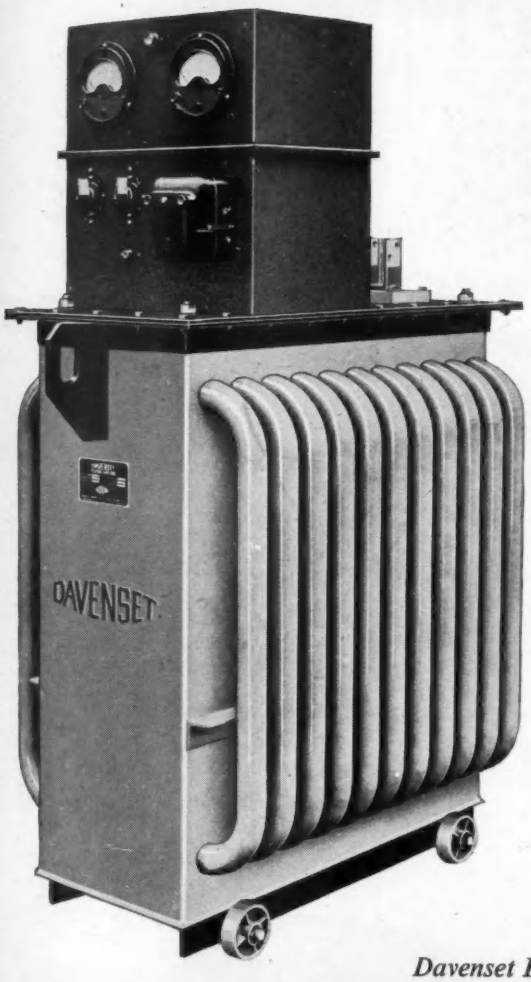

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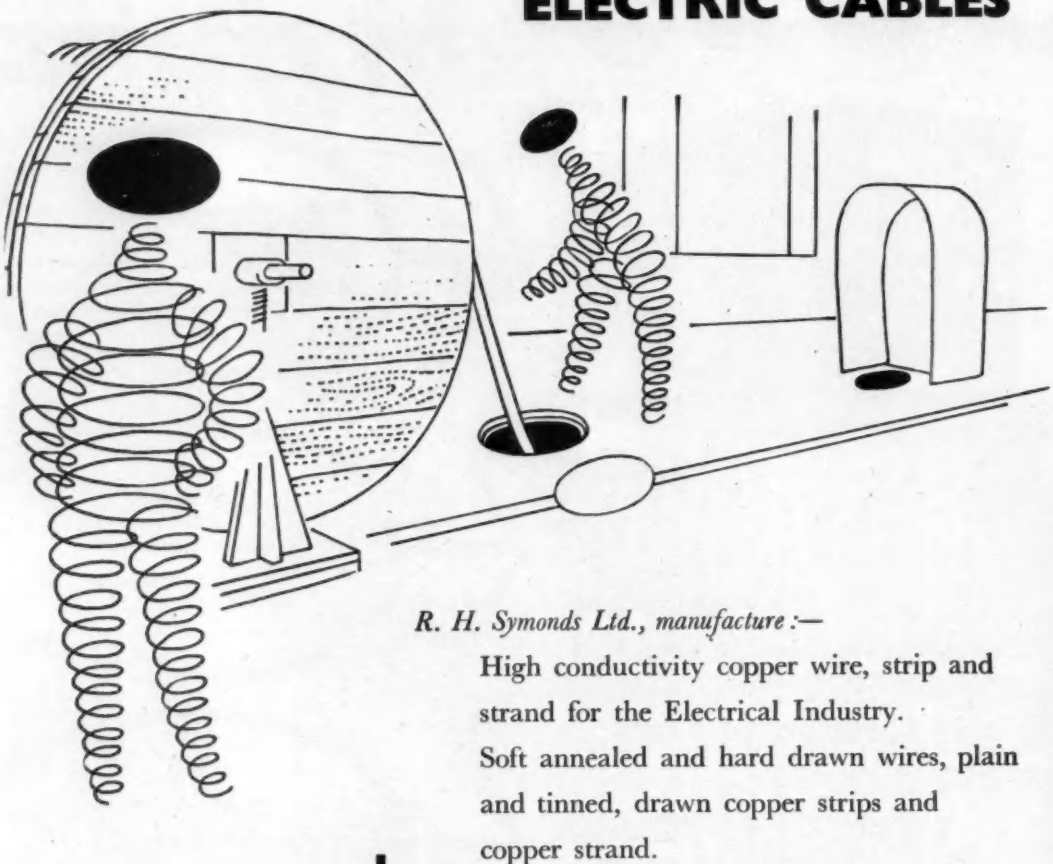

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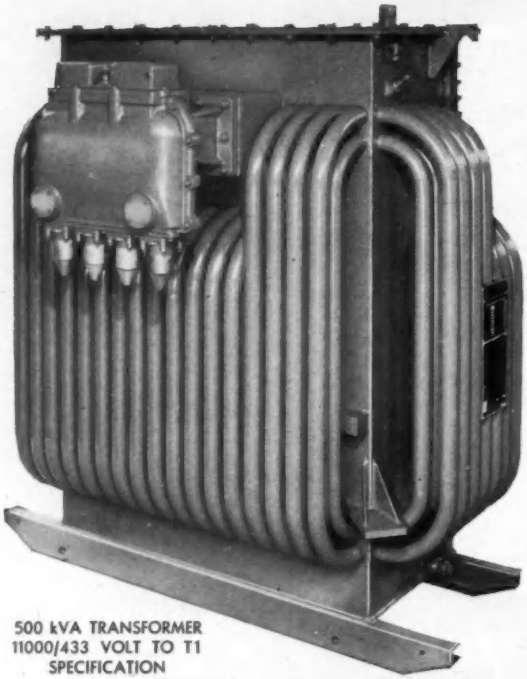
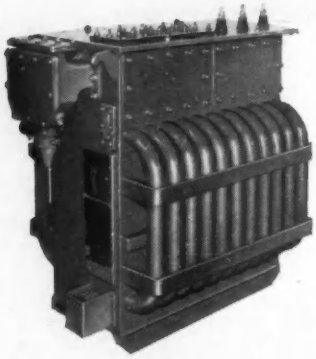


500 kVA TRANSFORMER 11000/433 VOLT TO T1 SPECIFICATION



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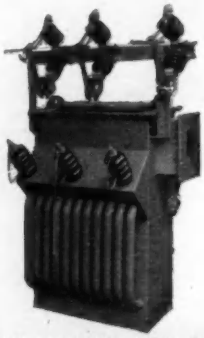
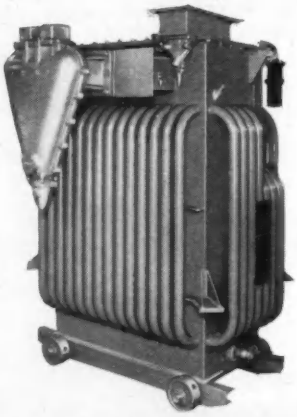


50 kVA 6600/400 VOLT POLE MOUNTING UNIT WITH H.T. ISOLATOR, L.T. FUSES AND CABLE BOX



250 kVA 3300/433 VOLT UNIT WITH NEUTRAL CURRENT TRANSFORMER IN TANK INTERLOCKED WITH TANK COVER

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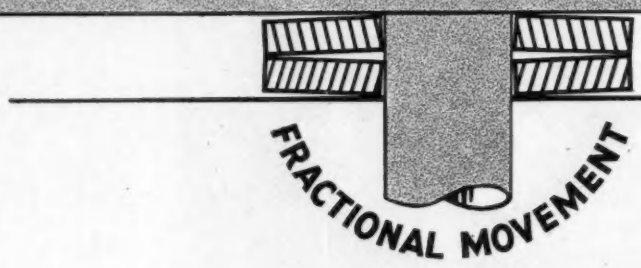

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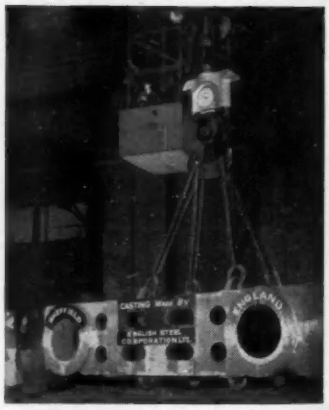

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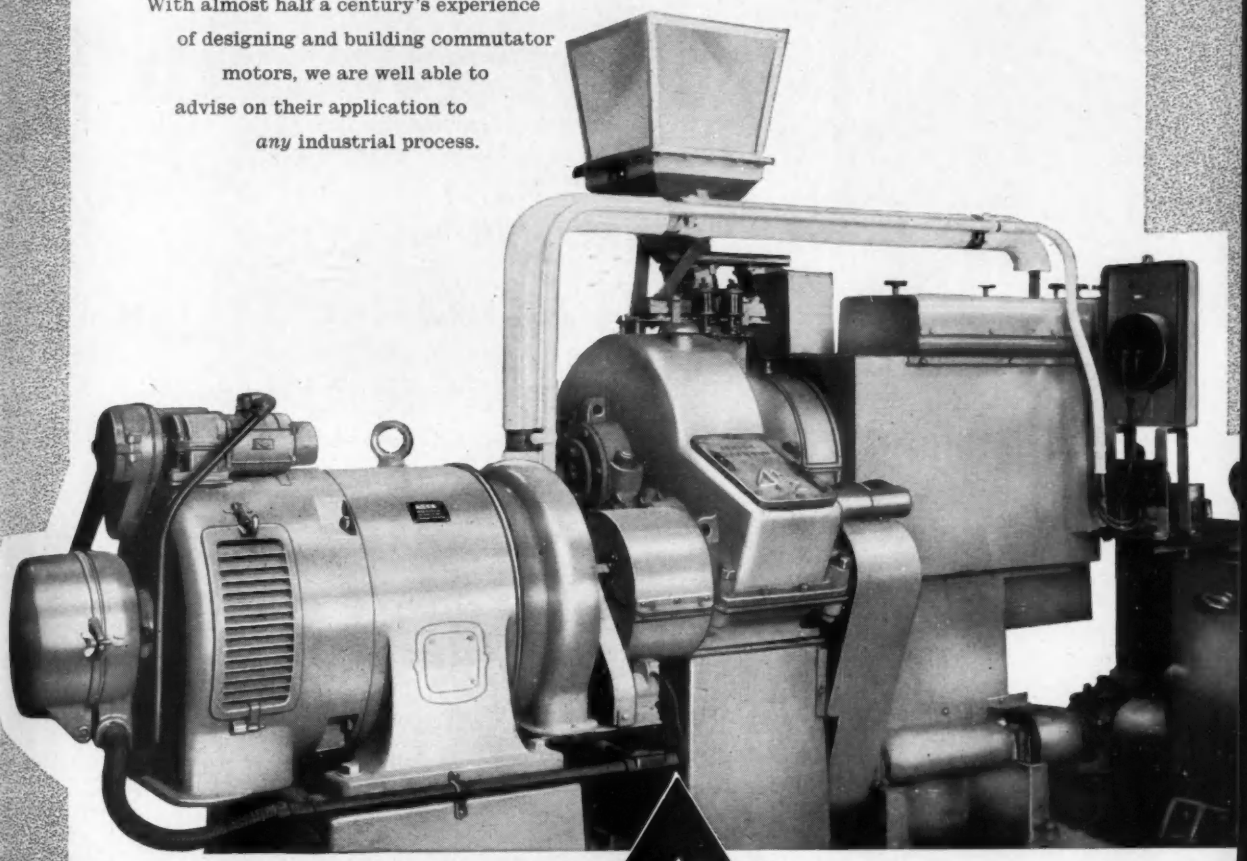

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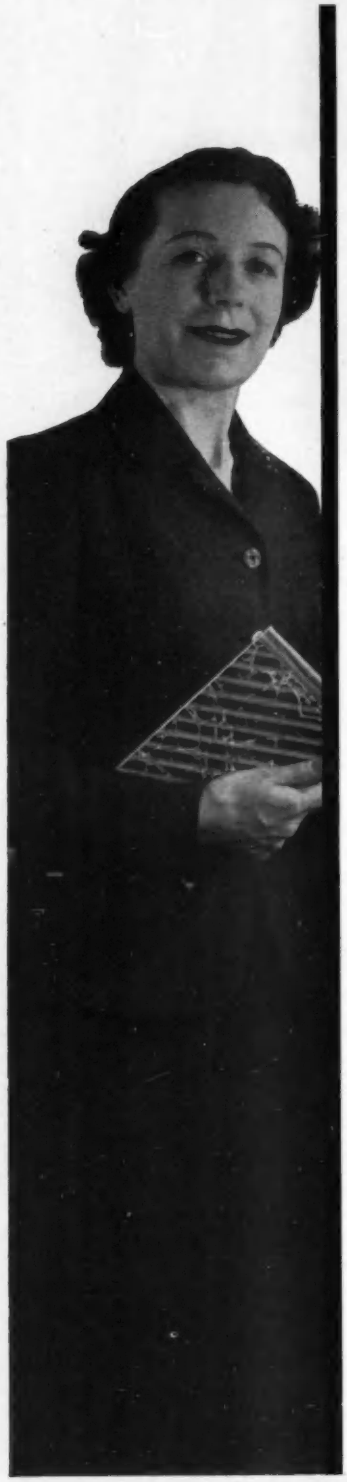

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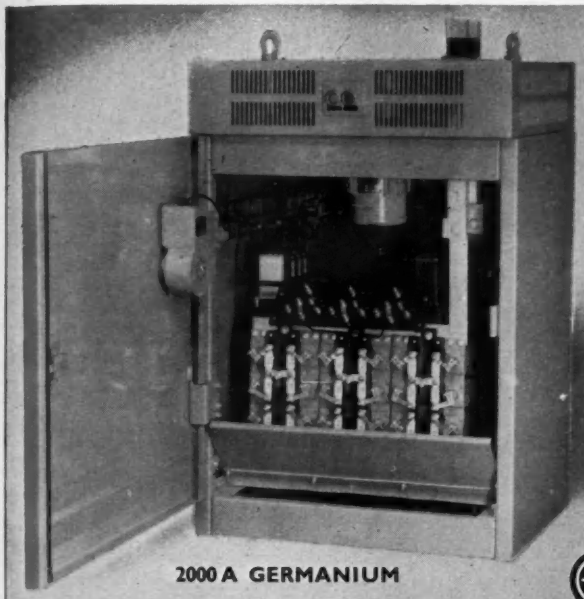

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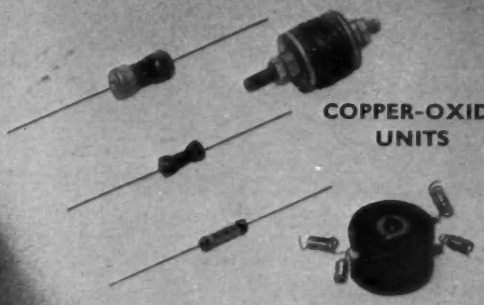

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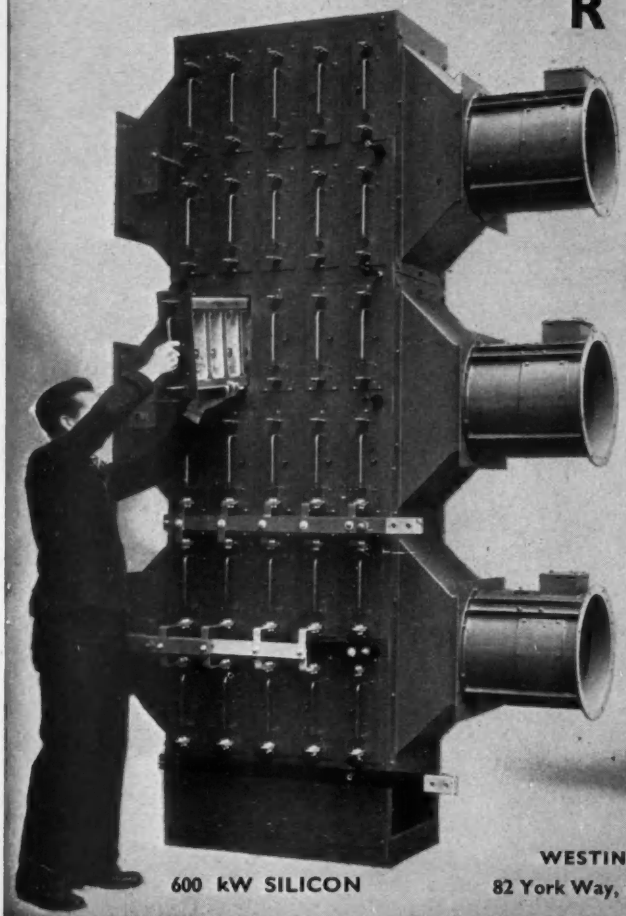

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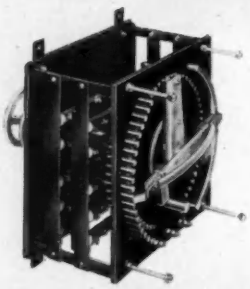

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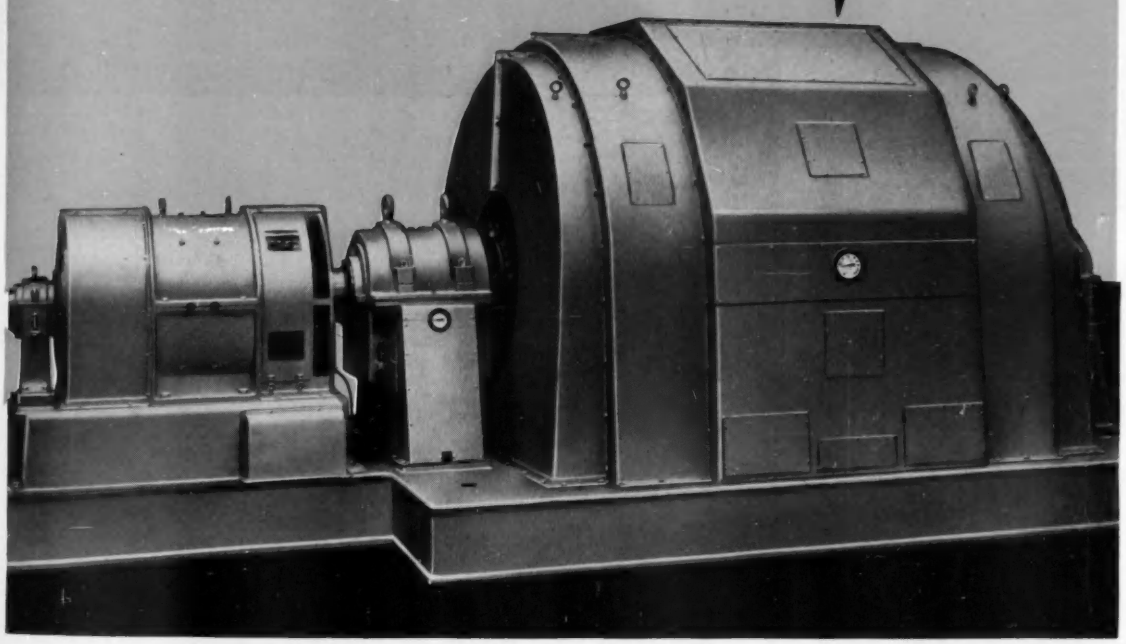
The illustration shows a 16,380 kVA synchronous condenser, one of three identical units supplied to an Australian electricity supply authority, for the regulation of voltage on long transmission lines with varying conditions of power flowing from power stations situated 200 miles apart



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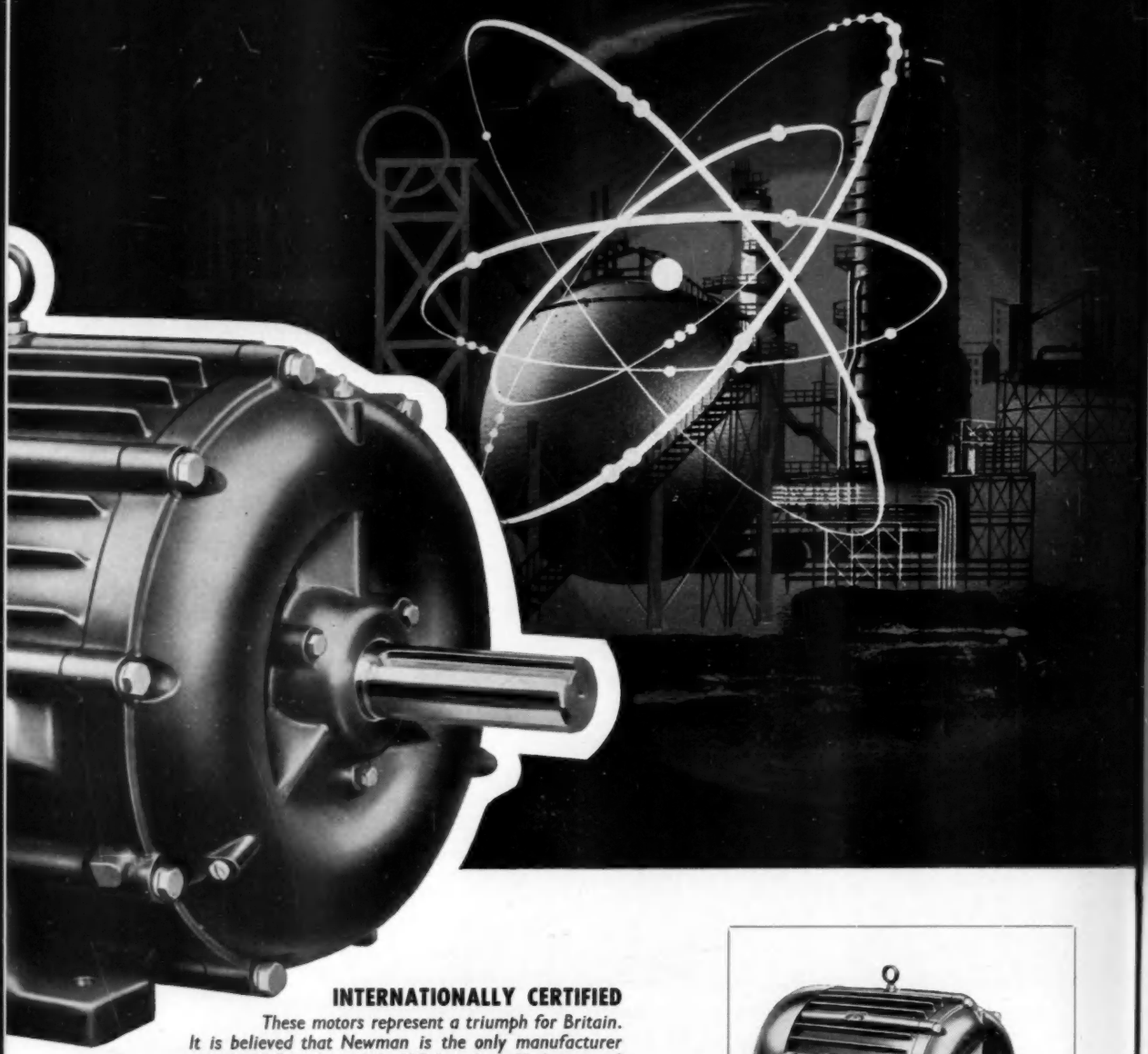

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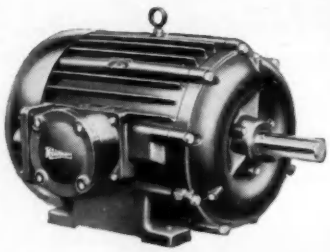

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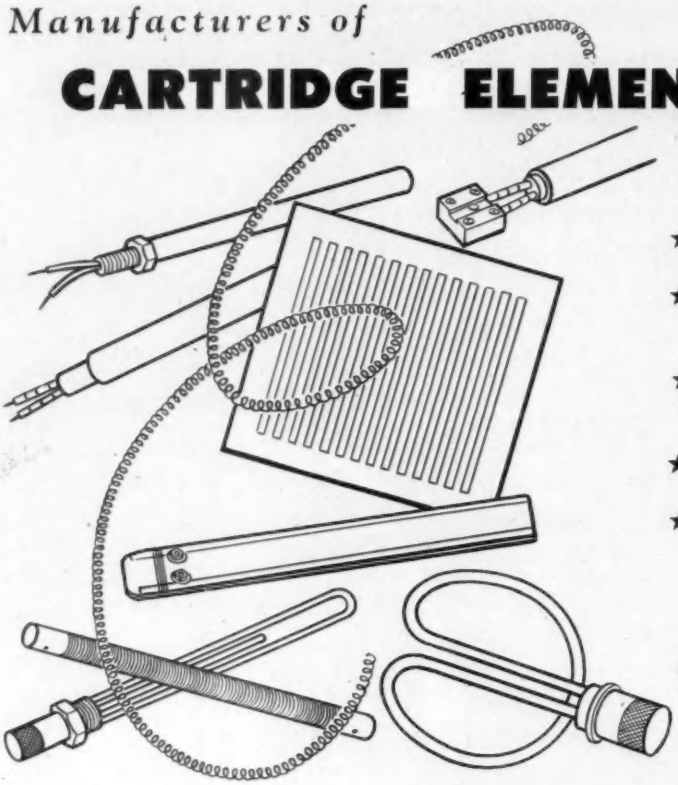

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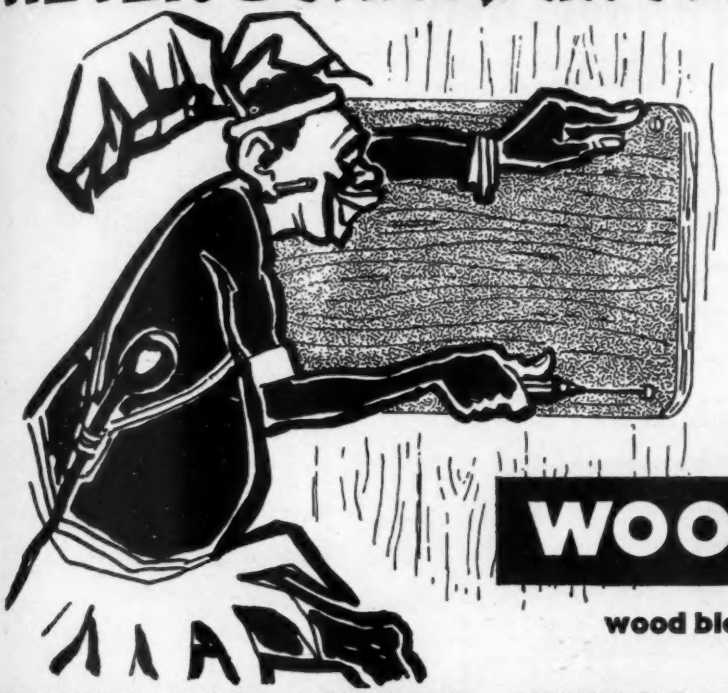

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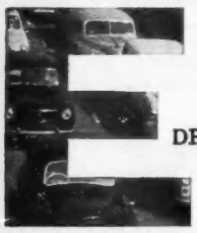

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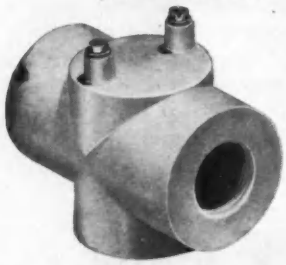

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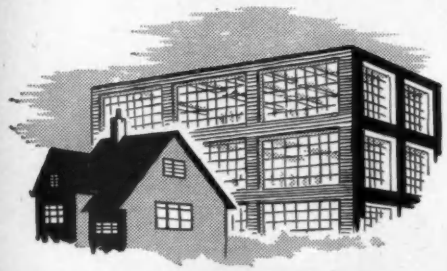

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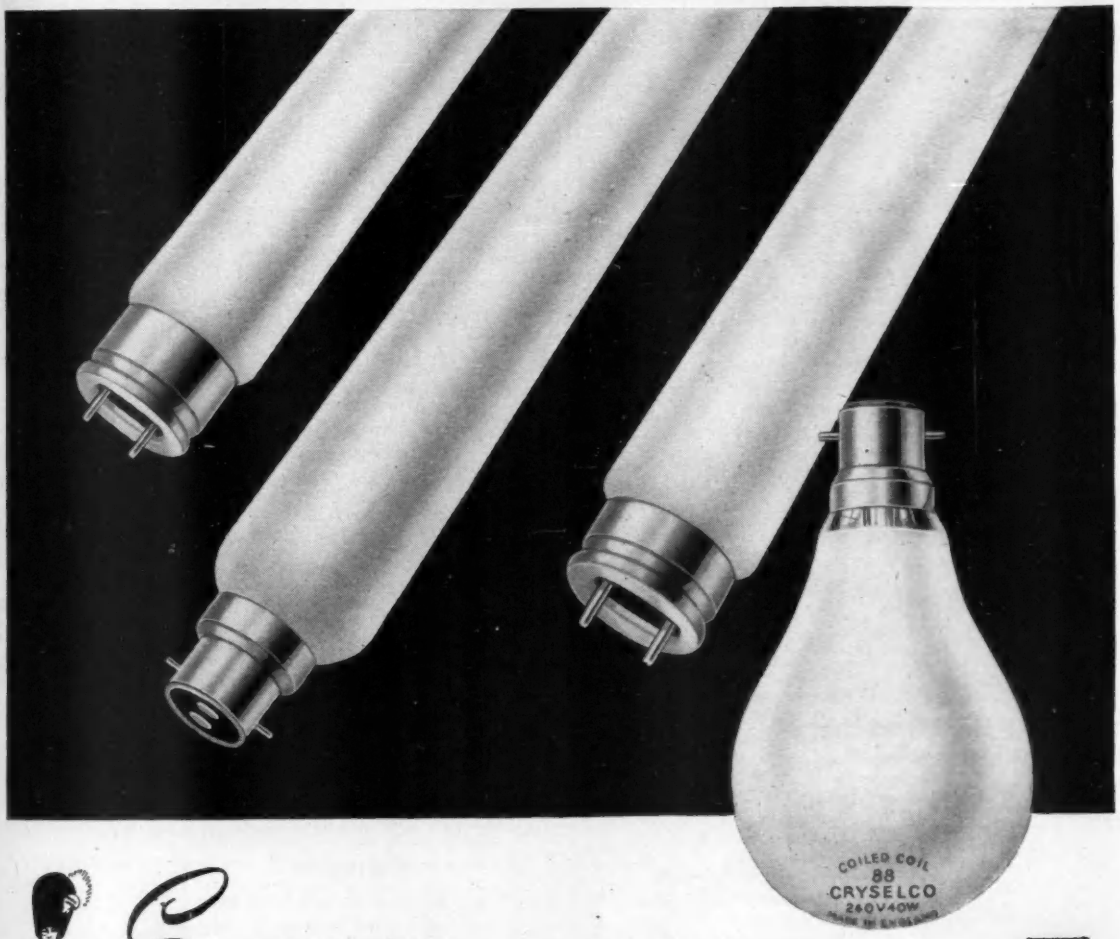

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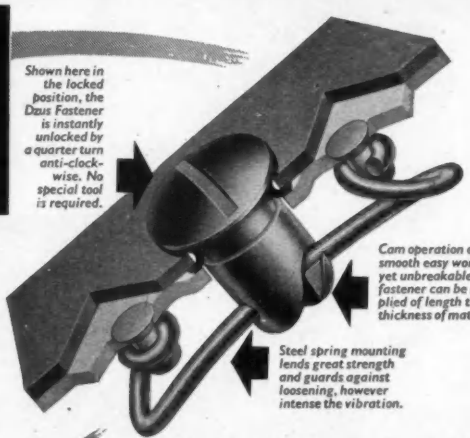

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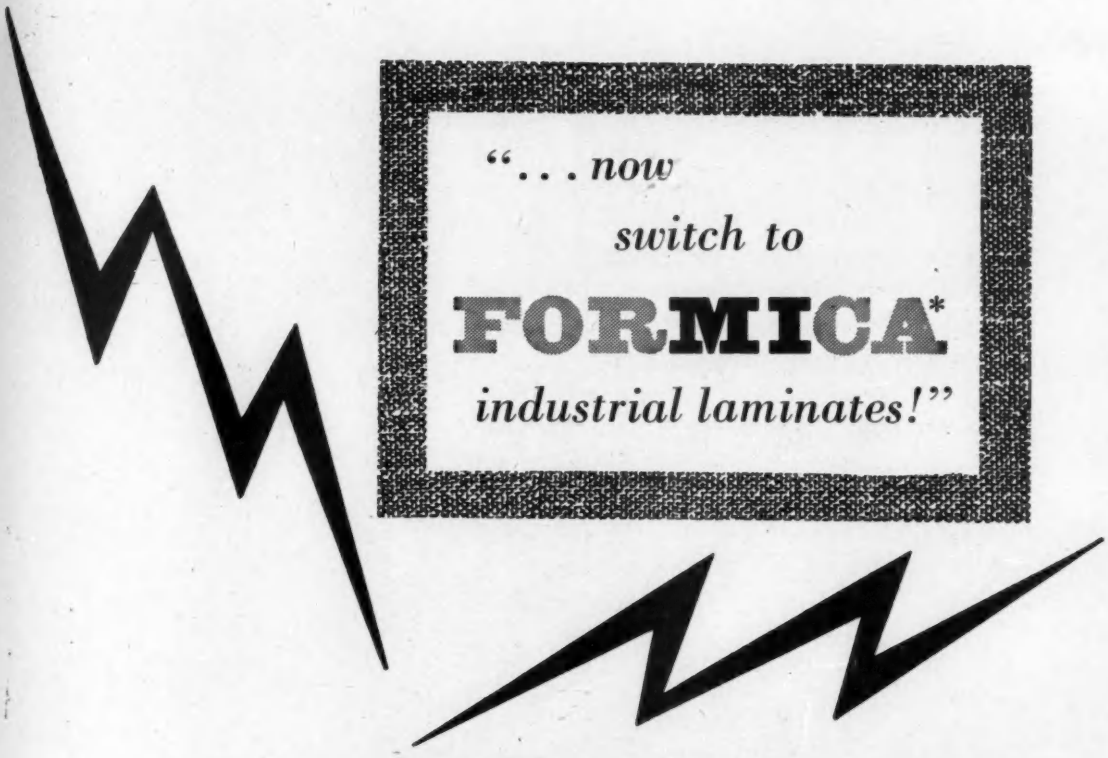

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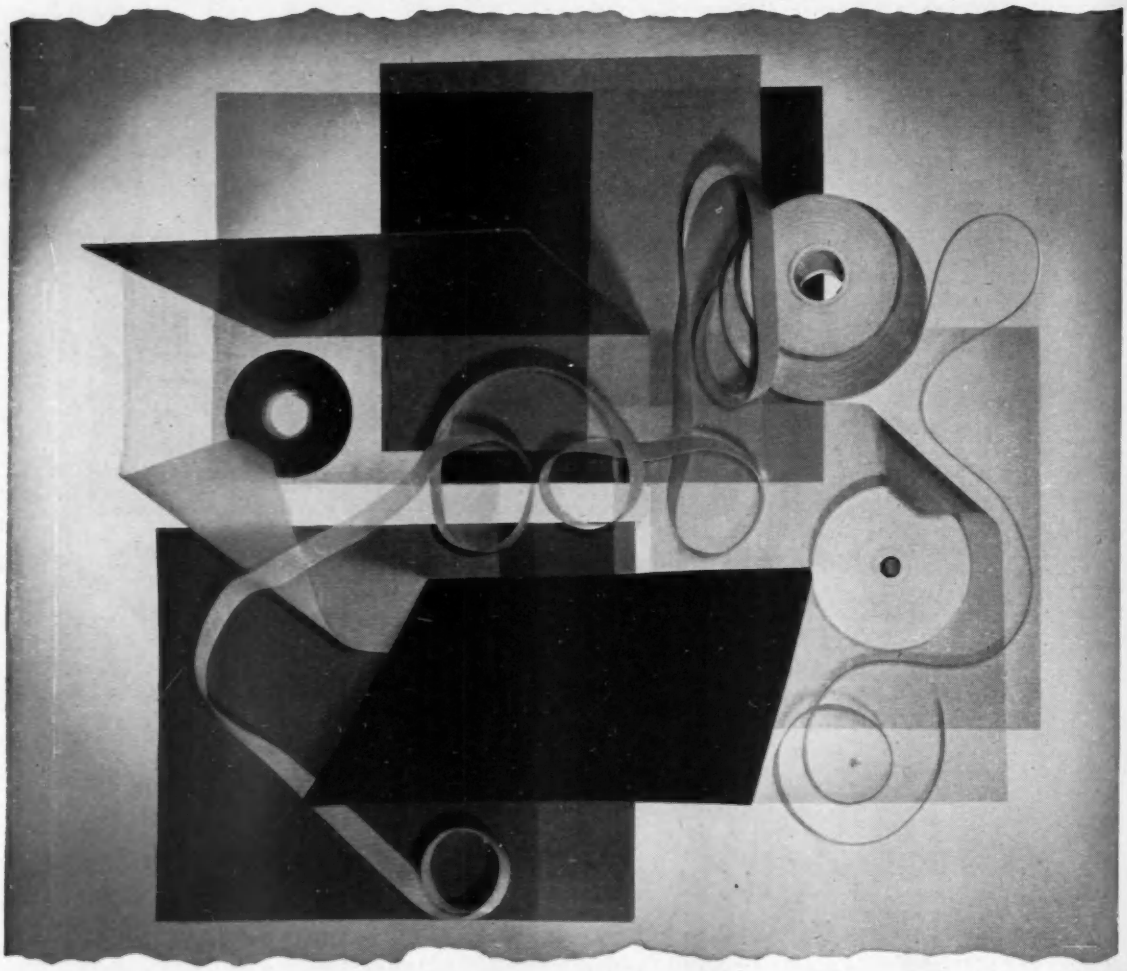

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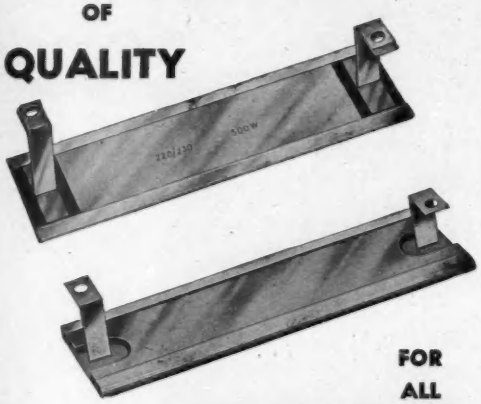

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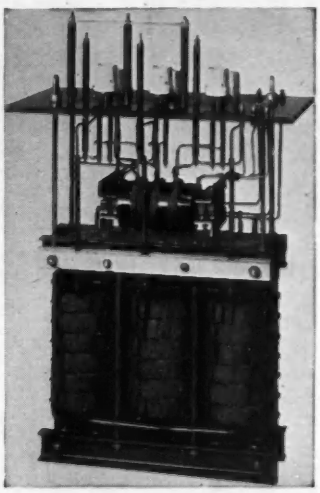

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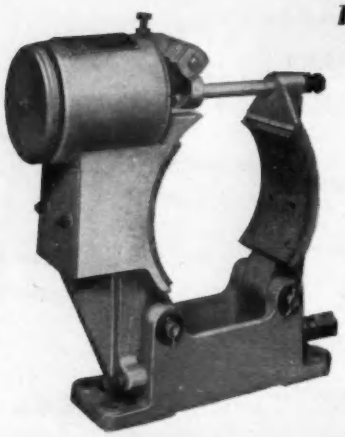

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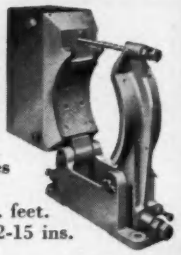

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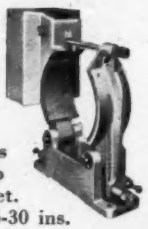

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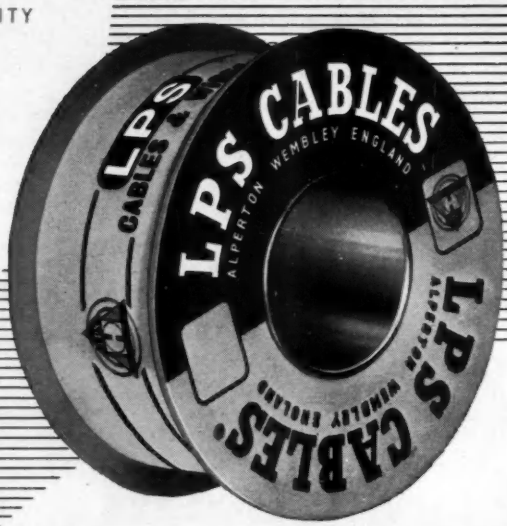

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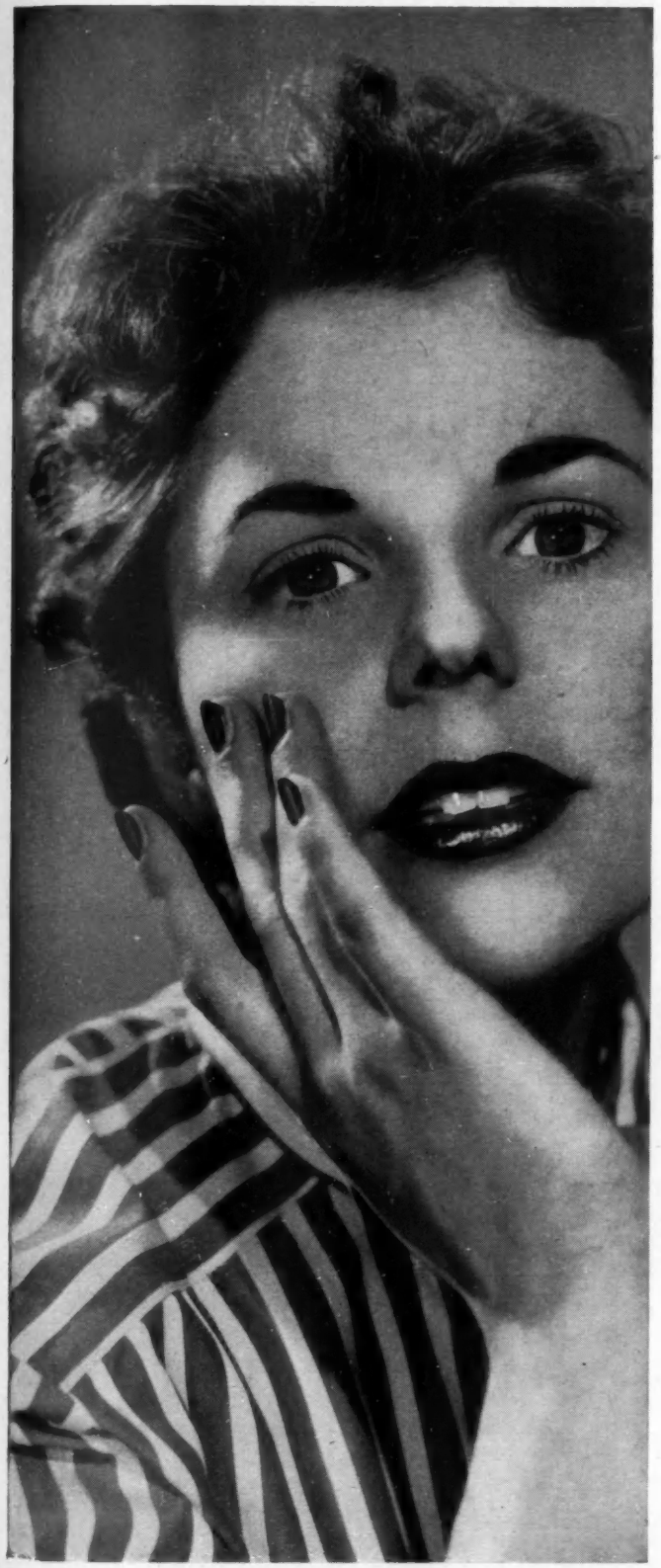

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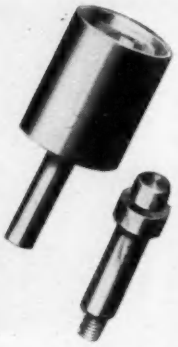

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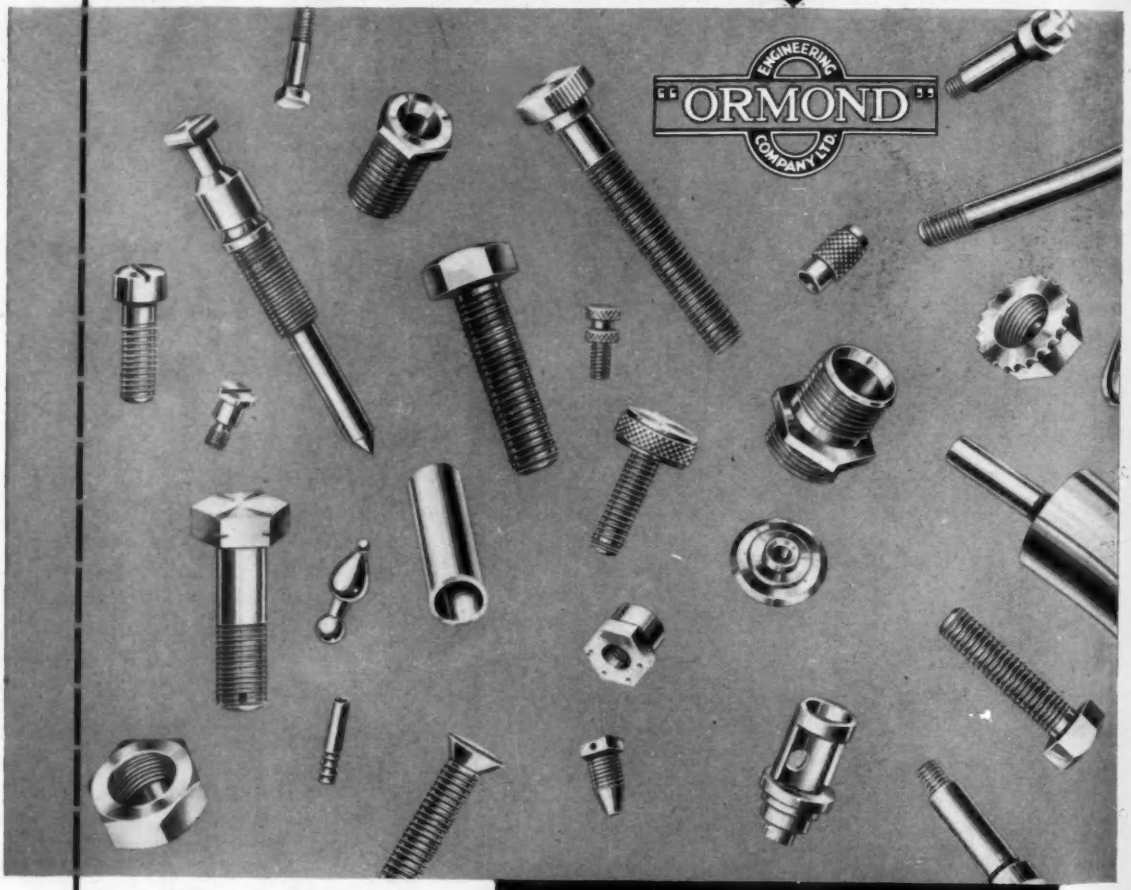

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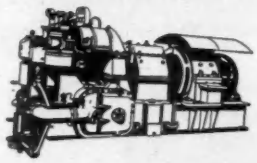

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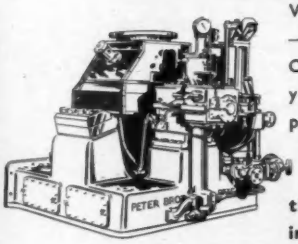

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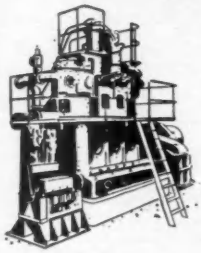

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P.1558

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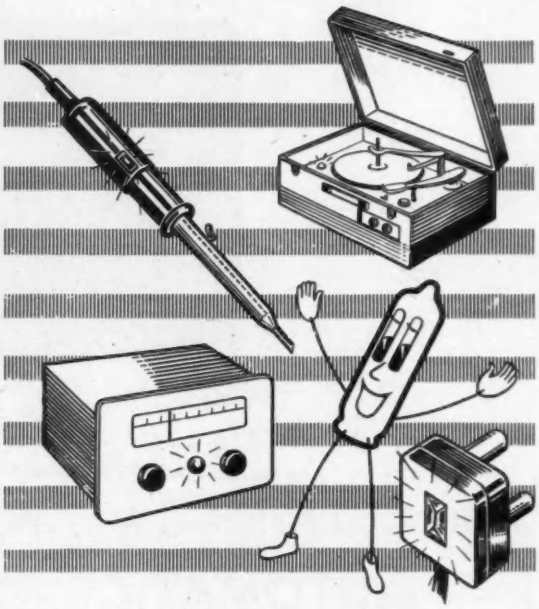

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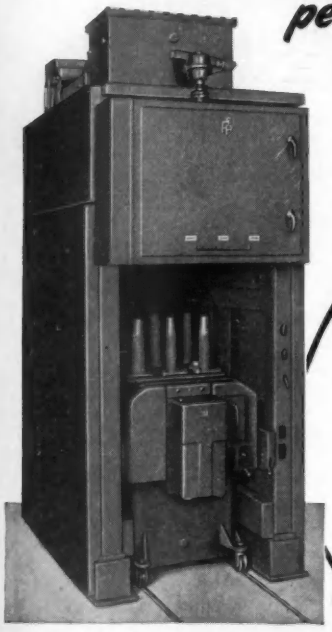

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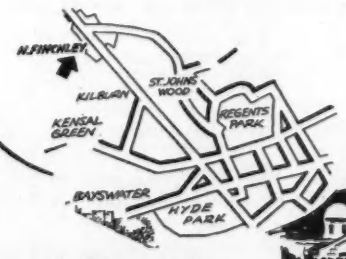

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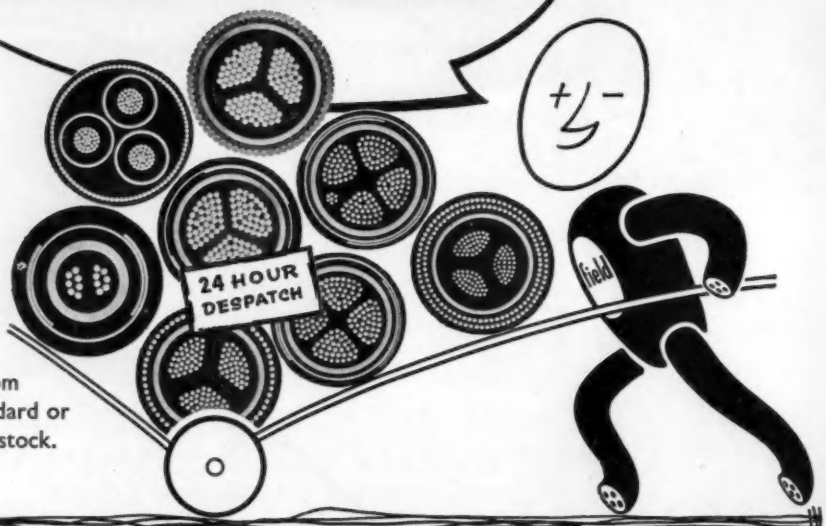

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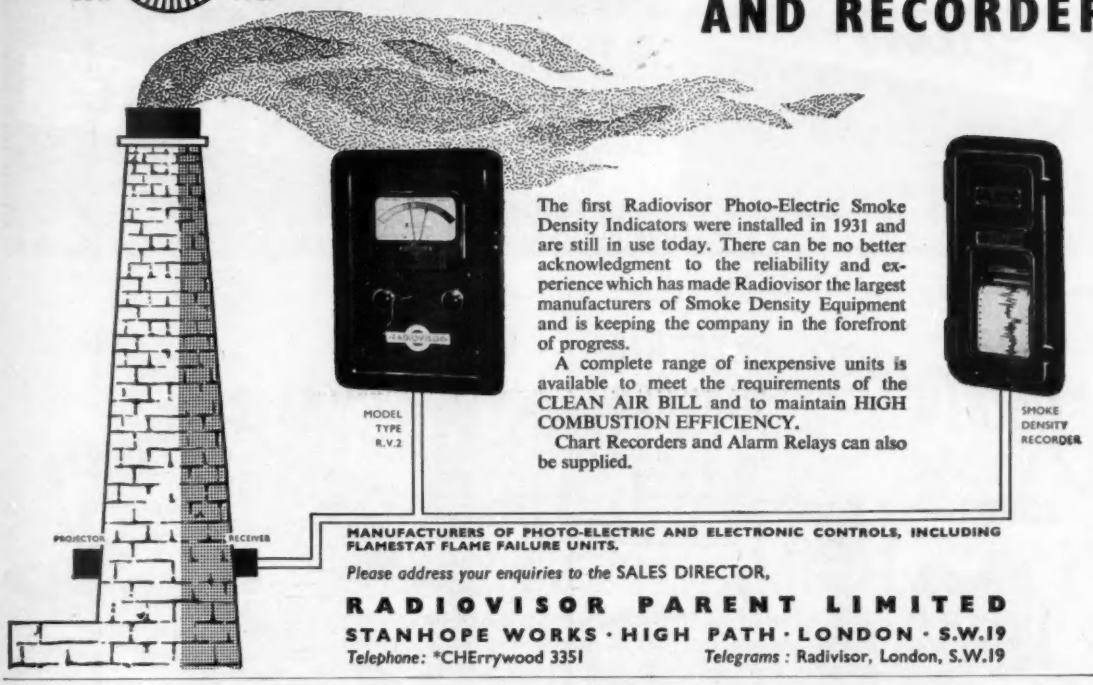

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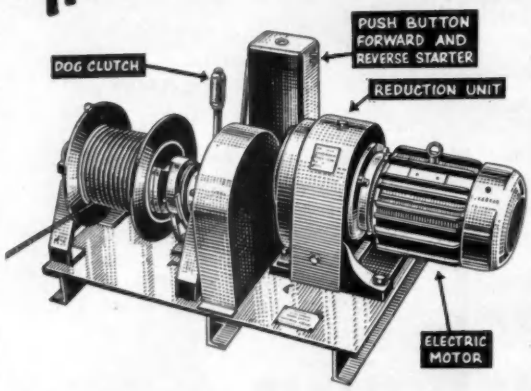

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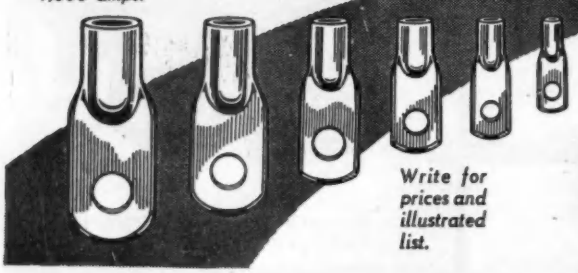

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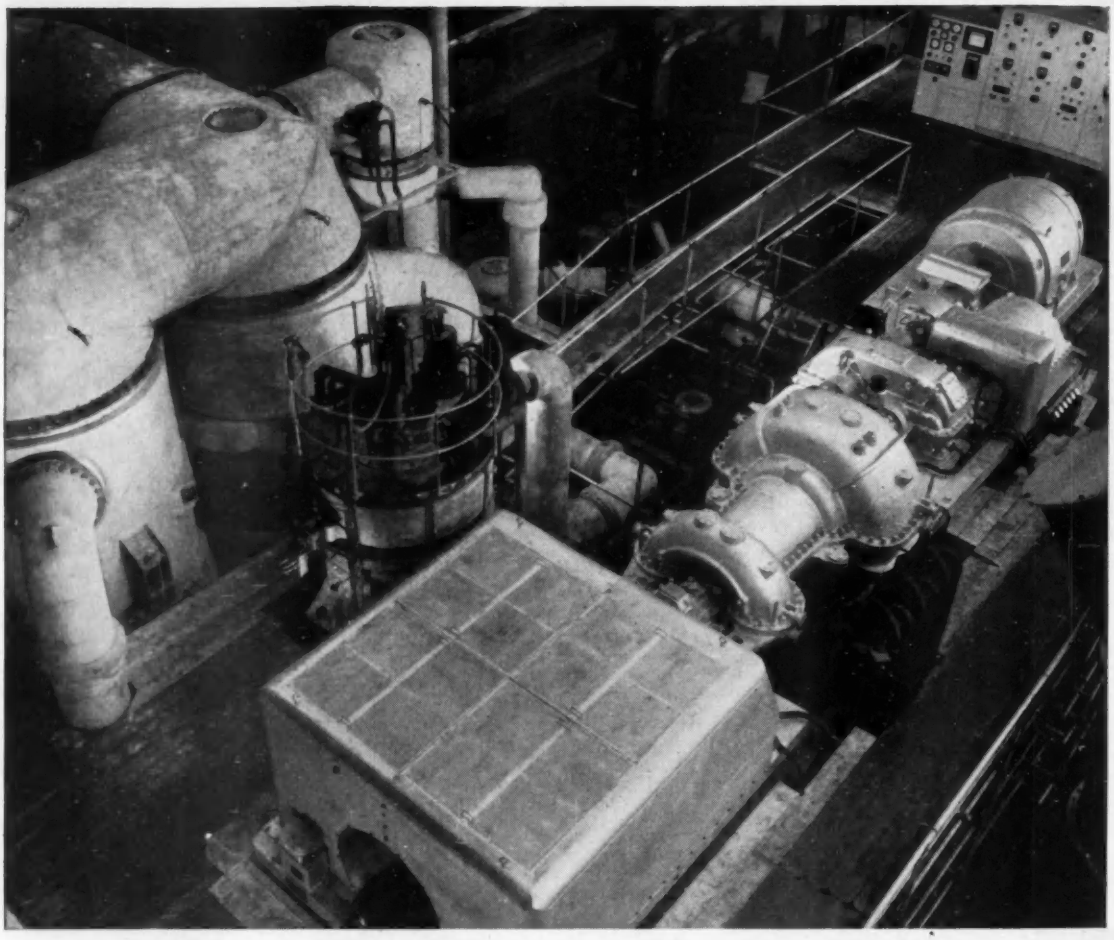

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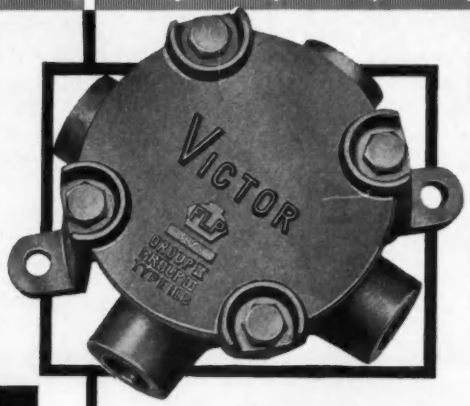

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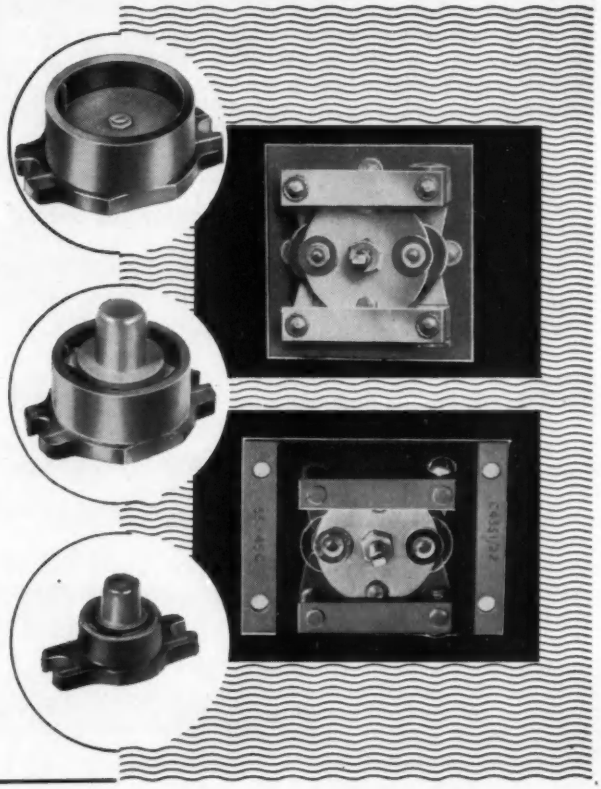

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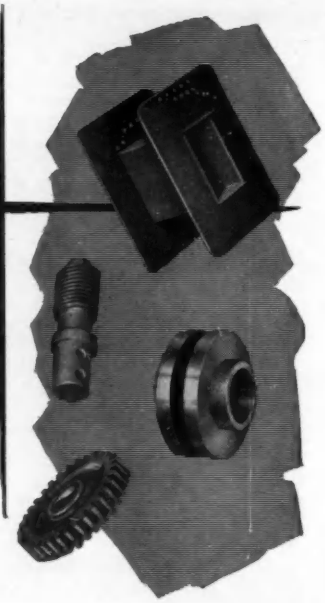

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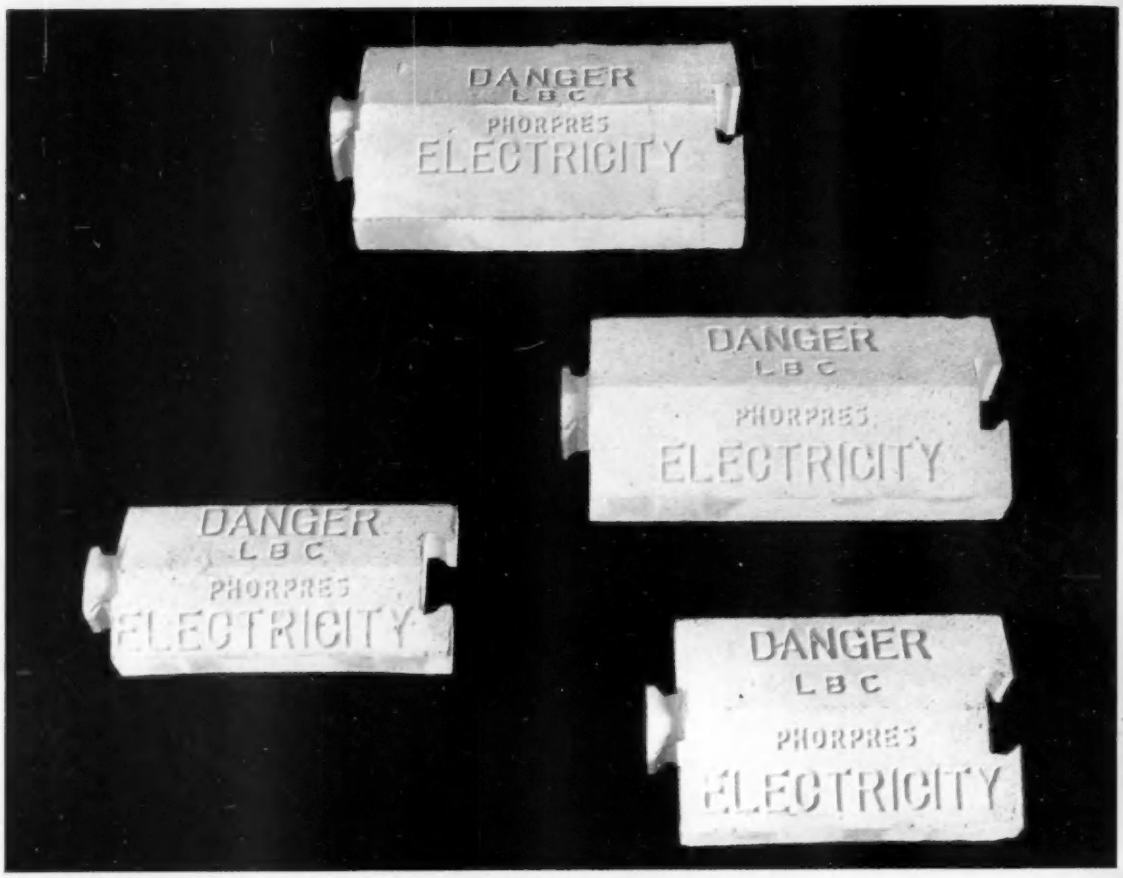

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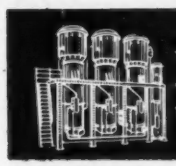
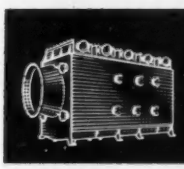


Thermo-compressor type Evaporator.



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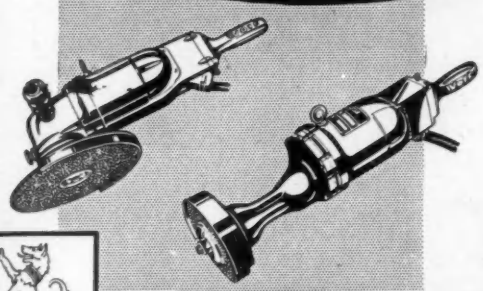

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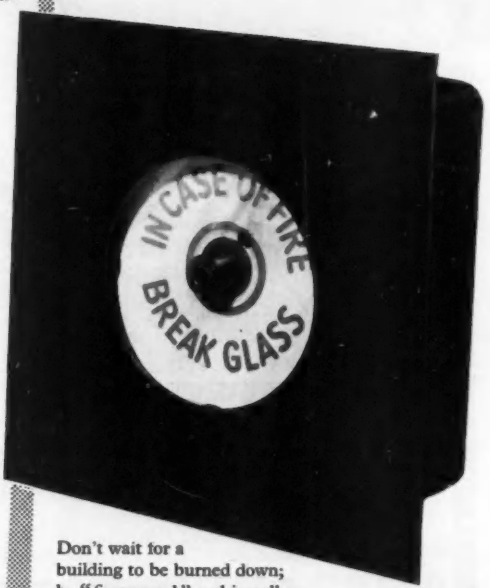

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"Colne" MOTOR CONTROL PANELS

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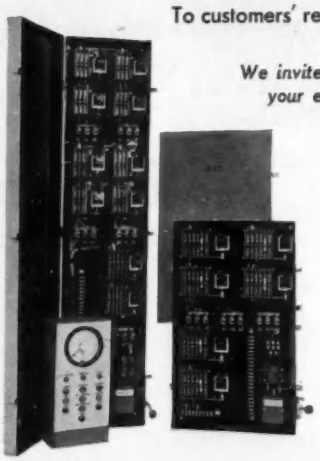

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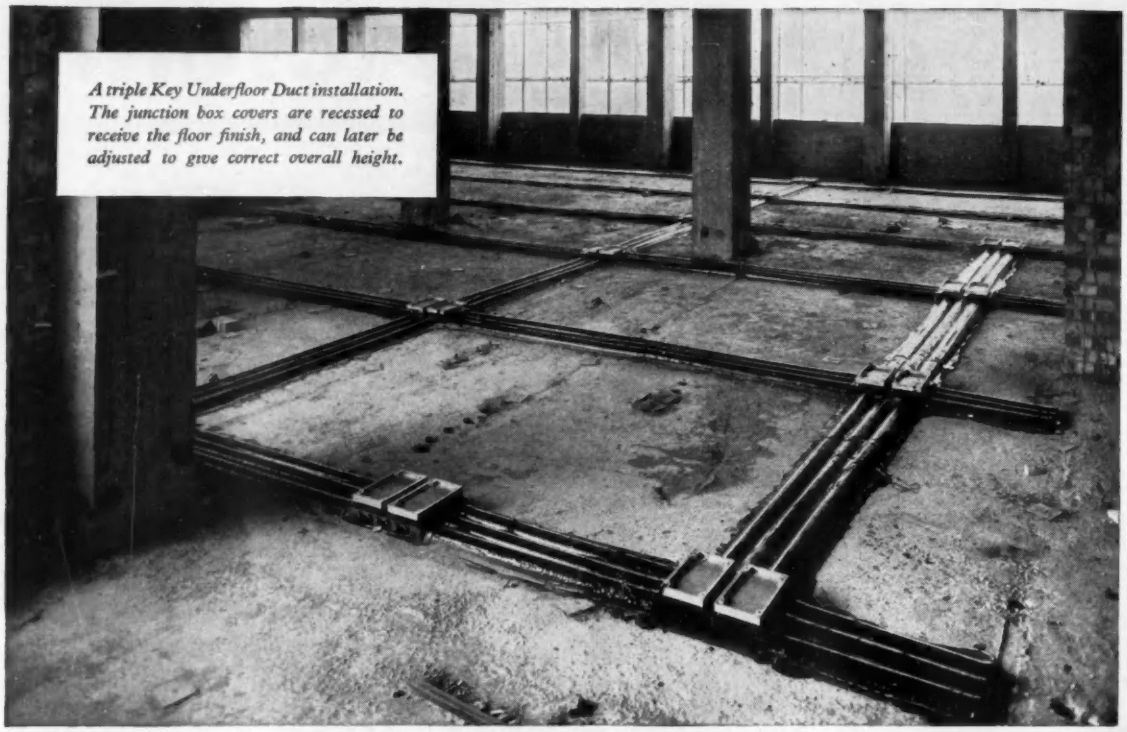
Key Underfloor Duct
solves wiring problems economically



A triple Key Underfloor Duct installation. The junction box covers are recessed to receive the floor finish, and can later be adjusted to give correct overall height.

Electric power and telephone outlets can be installed and added as necessary when Key Fibre Underfloor Duct is used. On a materials plus labour basis the cost of installations is lower than any metal system. Because of their light weight and ease of cutting and fitting, Key ducts can be quickly laid. Since there is no necessity to pre-position outlets, the architect can install an underfloor duct scheme, and later fit outlets to suit the occupant's requirements. The fitting of these outlets is a quick and simple matter and the most complete range of fittings is available for lighting and telephone systems.

easy to lay—low cost
completely adaptable

KEY UNDERFLOOR DUCT
conforms with B.S. 815 and is the original Underfloor Duct System. Key have the widest experience of Underfloor Duct Systems in the U.K.

Speed the job—cut the cost with the

KEY UNDERFLOOR DUCT SYSTEM

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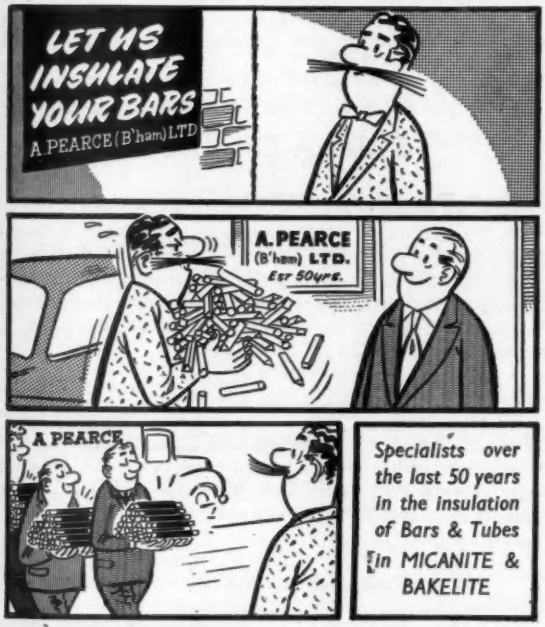
These two AIRSCREW standard Fan Ranges—Axial Flow and Centrifugal—can usually be relied upon to provide the fan you need at the time you need it. Every phase of design and manufacture is so closely controlled that we *guarantee* no AIRSCREW Fan will give less than its rated duty—though it may give more. The Airscrew Technical Service is ready and willing to assist in the selection of the correct fan whether from standard range or individually designed.

Airscrew fans for industry

THE AIRSCREW COMPANY & JICWOOD LTD., WEYBRIDGE, SURREY. Tel: Weybridge 2242/7



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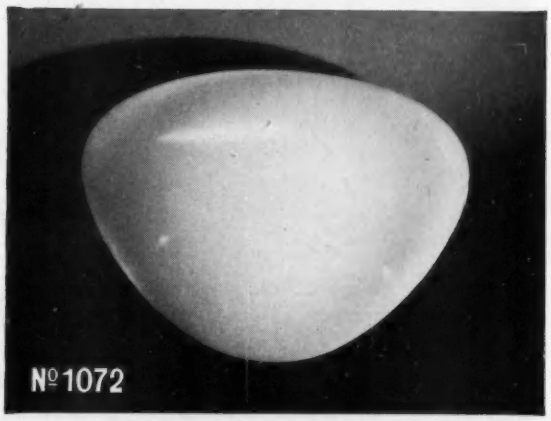

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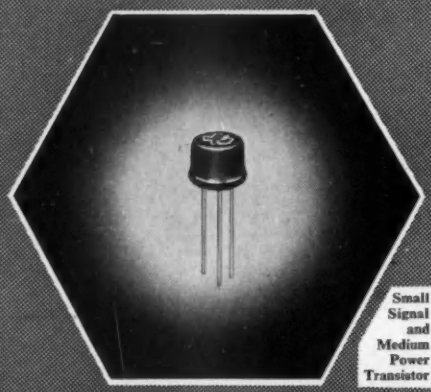
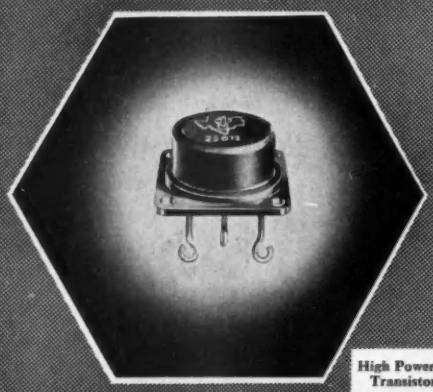
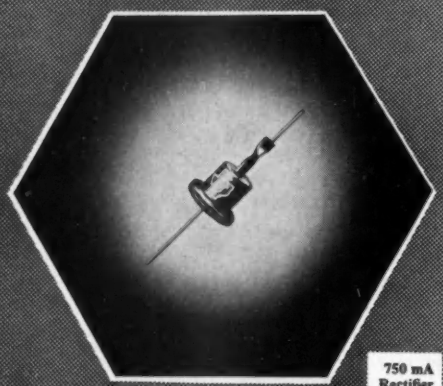


Small Signal and Medium Power Transistor



High Power Transistor



750 mA Rectifier

All illustrations are actual size

Silicon Transistors

Small Signal

This range of general purpose transistors is used for high gain, low level applications. Special features are:—negligible leakage current, a minimum alpha cut-off frequency up to 20 Mc/s, and a tetrode series providing 16 db gain at 30 Mc/s.

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These 4-watt diffused base silicon transistors are ideally suitable for output stages in servo amplifiers. A pair in push-pull operation provide sufficient power to drive many types of servo motors. Two types are available, one with a maximum collector voltage of 60, the other of 100; the former is particularly useful for operating from 28-volt battery supplies.

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Silicon Diodes

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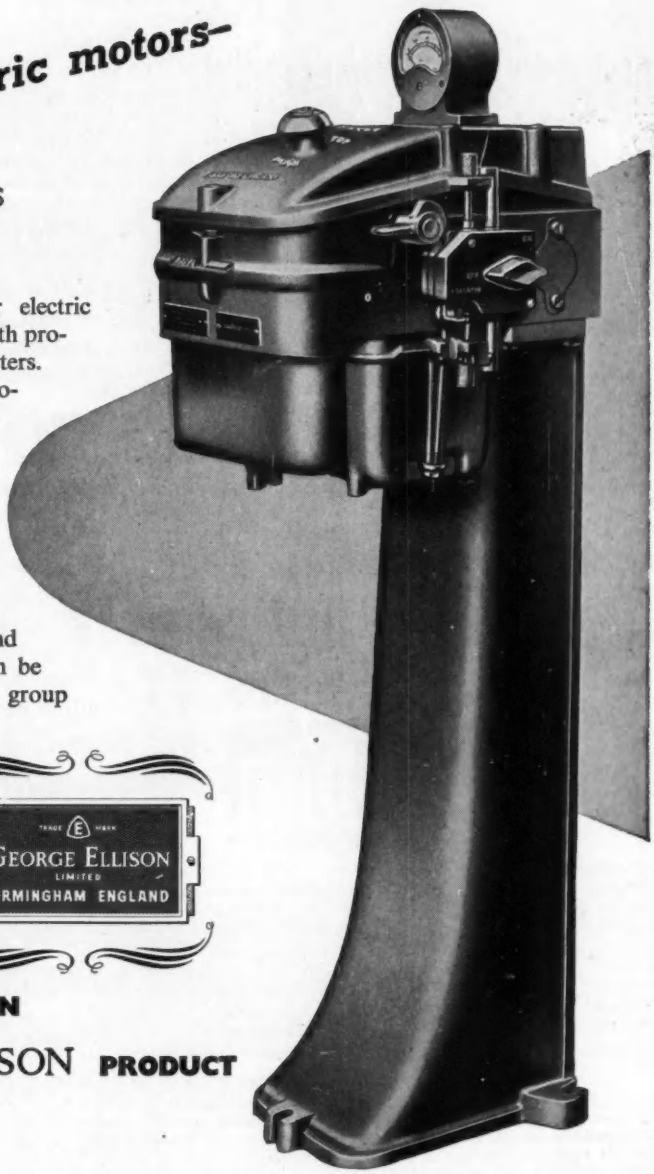

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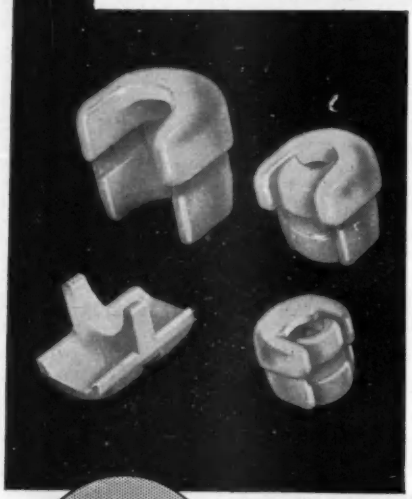

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(FULLY PATENTED)

Since their introduction to Britain from the U.S.A. I.M. NYLON STRAIN RELIEF BUSHINGS are being used by an ever-increasing variety of trades—Clocks, Radios, T/V., Fans, Toasters, Mixers, Vacuum Cleaners, Washing Machines, Portable Tools, Air Conditioners, Electric Mowers, Clippers, Drills, Saws, etc. They are rapidly becoming "Standard" where a positive, insulating, non-slip grip is essential. Made from Nylon, they grip tightly without nipping and give a streamlined appearance to the job.

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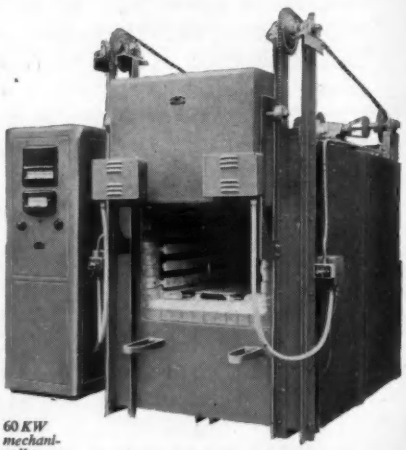
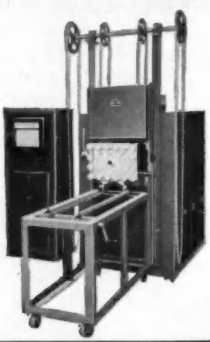
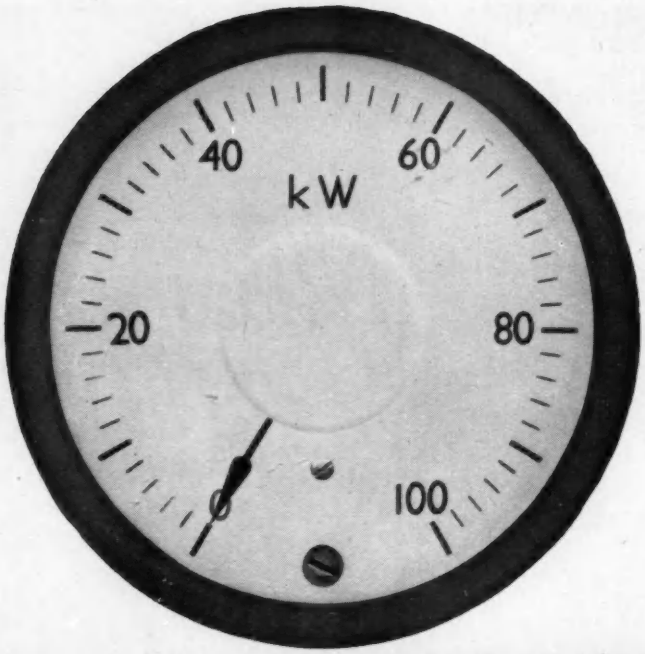


60 KW mechanically operated model. Internal dimensions 54" × 24" × 18"



Hand-operated model, fitted with self-contained atmosphere equipment. With two or more containers the furnace can be kept in continuous production.



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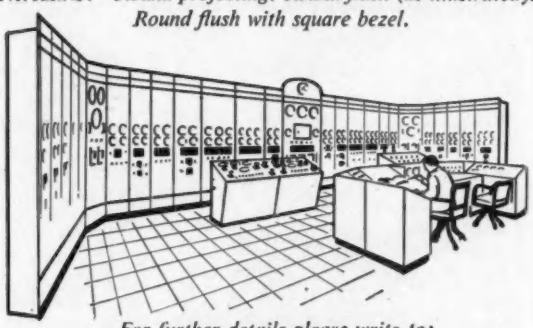

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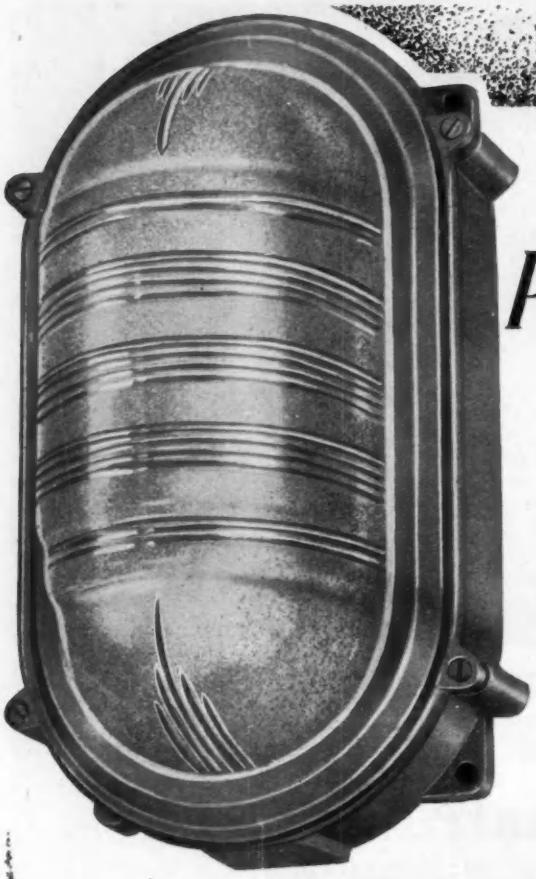

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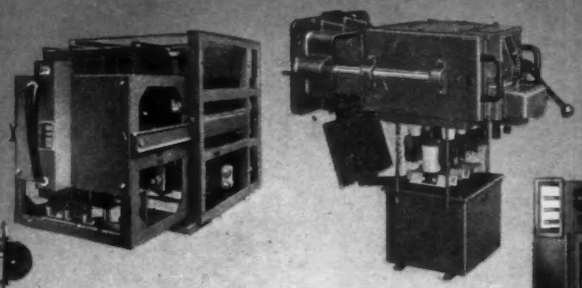

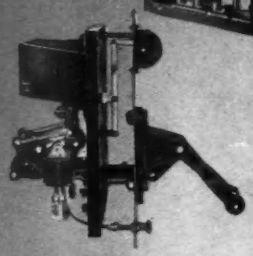

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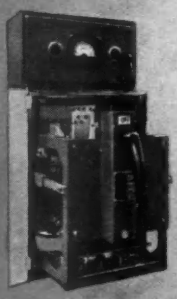

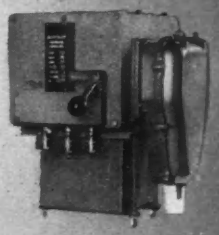

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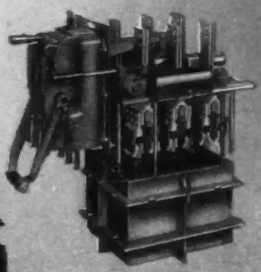

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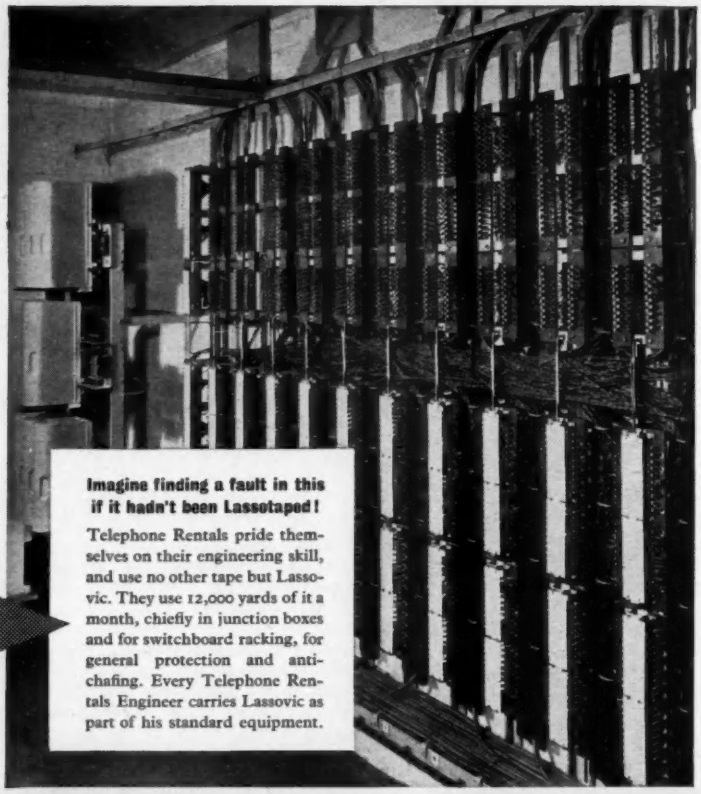

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Telephone Rentals pride themselves on their engineering skill, and use no other tape but Lassovic. They use 12,000 yards of it a month, chiefly in junction boxes and for switchboard racking, for general protection and anti-chafing. Every Telephone Rentals Engineer carries Lassovic as part of his standard equipment.

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up to 5,000 kVA

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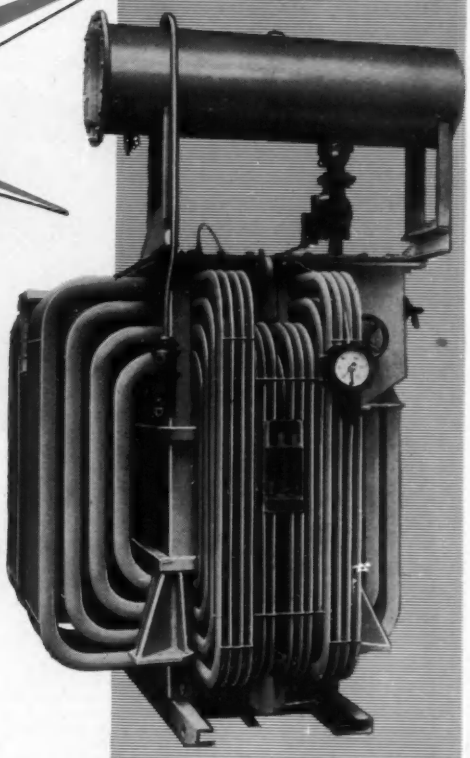

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are manufactured in ratings up to 5,000 kVA and for voltages up to 33 kV. They have been supplied for service in all parts of the world under the most arduous climatic conditions.

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- **This has been designed to "cut through" all noise levels in factories. These sirens can be supplied to work on any voltage AC or DC.**
- **Easily portable (weight 4 lbs.) and can be carried round to every department and plugged into any convenient lighting point so as to determine the number required for the whole factory.**

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Father: That's an electrical thing called an Outdoor Terminal Box, son.

Son: Does it always live out of doors, then?

Father: Yes, son.

Son: Even when it's raining? Has it got a mackintosh, Daddy?

Father: It's a thing, not a person. It's designed that way — it doesn't *need* a mackintosh.

Son: Doesn't it ever get a cold?

Father: No!

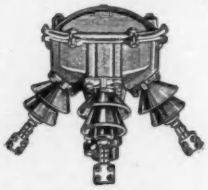
Son: Who makes these Outlaw Terminus Boxes?

Father: Outdoor Terminal — Henley's, principally.

Son: Is they princely people then?

Father: Come to think of it, they is . . . are, really!

OUTDOOR TERMINAL BOX 11,000 V.
Send for Catalogue 33



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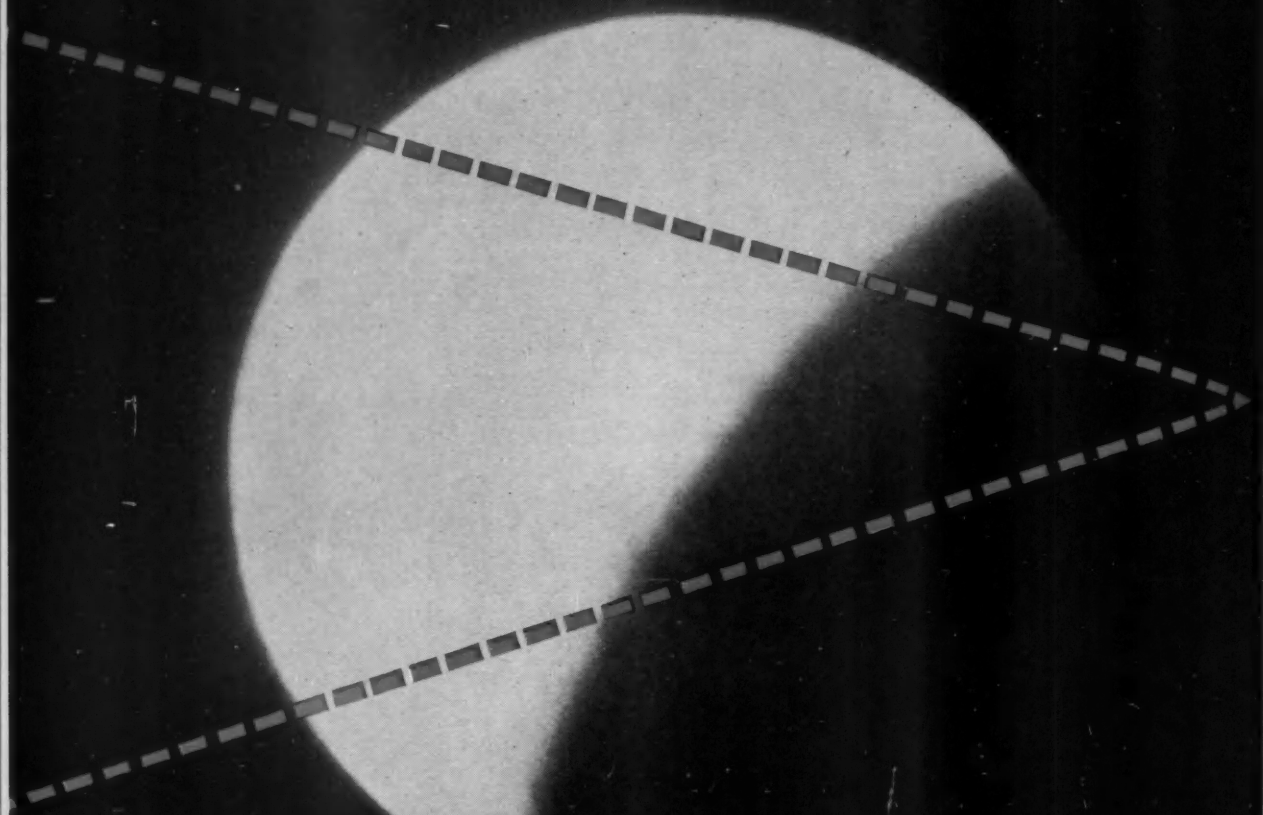

where it's wanted

with Simplex lighting equipment

One side of the picture—
the light we cannot alter: the light of a solar system

And the other side of the picture—
Electric light . . . beamed, diffused, controlled in a hundred different ways by Simplex lighting fittings: all competitively priced — sensible, modern and attractive in design. Simplex lighting specialists, with their background of 60 years' leadership, offer their help with all your lighting problems . . . from recommending the best methods and fittings, to preparing — without obligation — complete lighting layouts and estimates

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For 60/100w GLS lamps
Two striking new ranges of screwglass fittings here — simple and modern design. *Weatherproof, corrosion resistant,* Simplex screwglass fittings are ideal indoors or out. The two types: vitreous enamelled (acid-resistant) cast iron or cast aluminium alloy. Reflectors in pressed aluminium (optional) to suit all types. 60w complete with B.C. lampholders in bakelite — porcelain optional extra. 100w with porcelain lampholders as standard

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Screwglass
for 60/100w GLS lamps

lighting fittings by

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Scientists of more than 50 nations will be observing such phenomena throughout the International Geophysical Year
Photograph by courtesy of THE TIMES

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Branches throughout Britain and agents throughout the world

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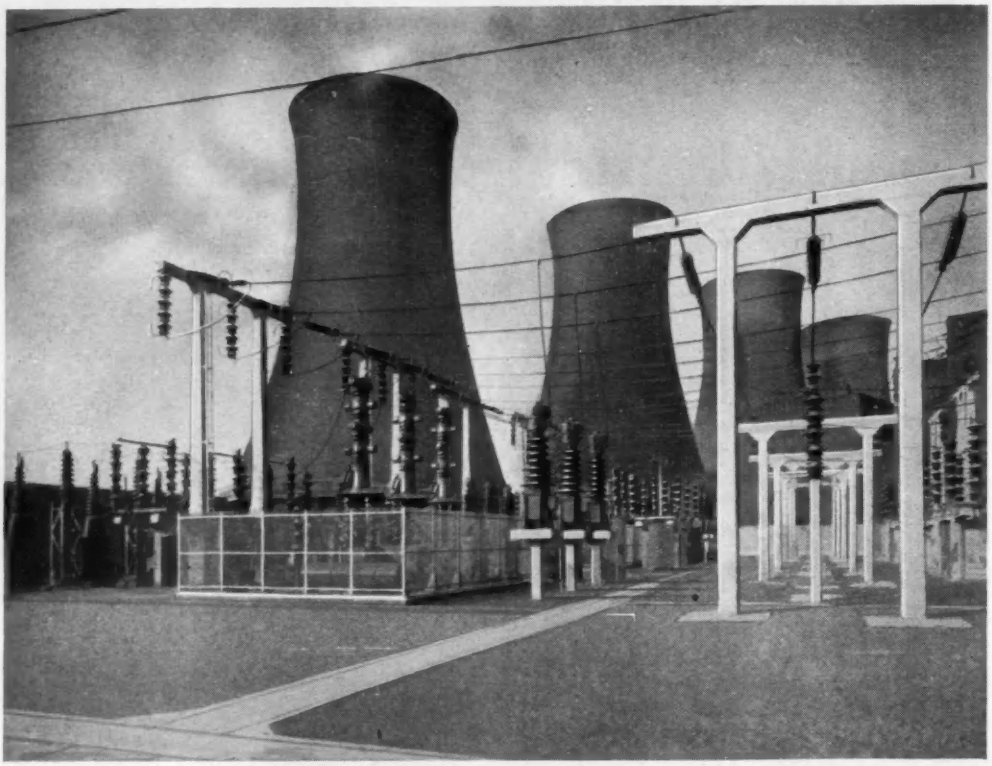

Photography by courtesy of the CEGB Midlands Division

Hams Hall C

Hams Hall C switching-station, the largest in Great Britain and one of the largest in Europe, is equipped with Reyrolle 132-kV 3,500-MVA air-blast switchgear

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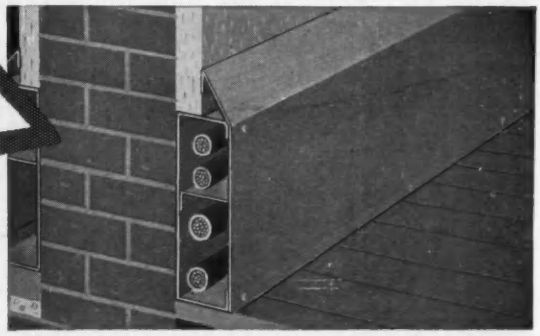

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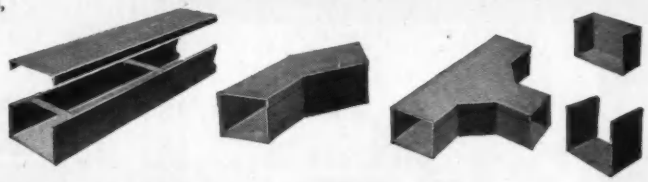

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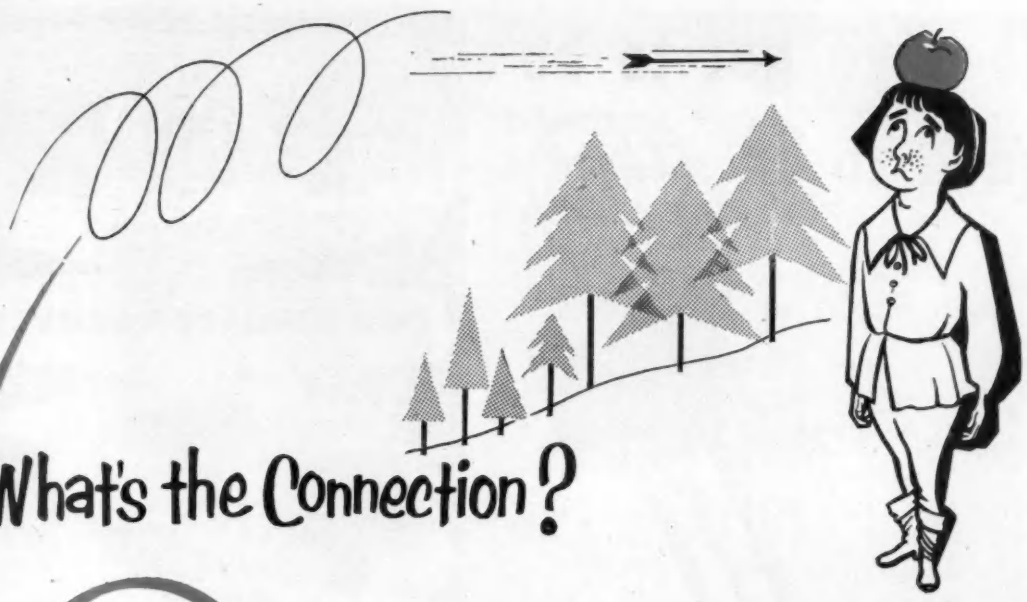

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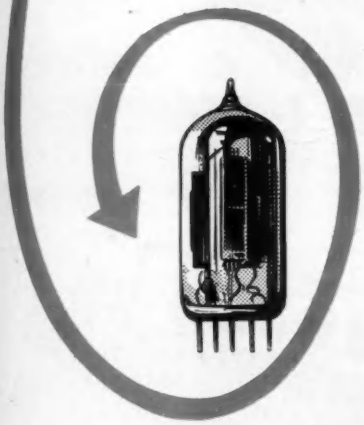

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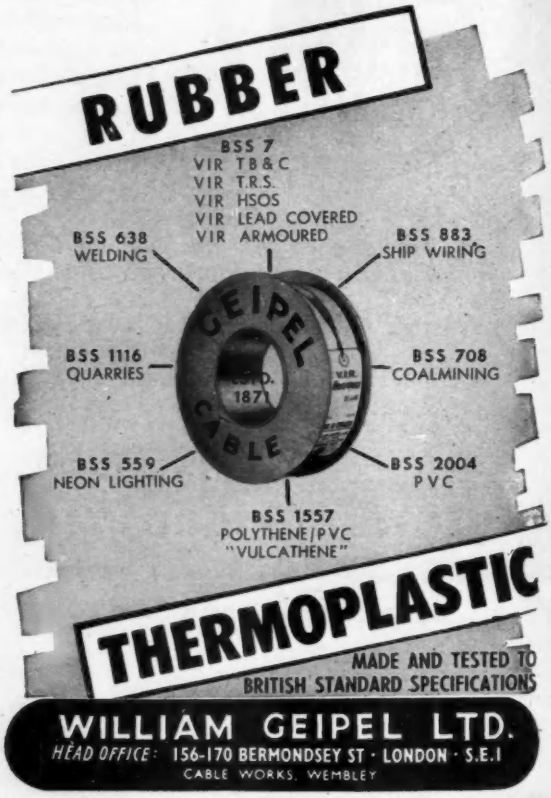

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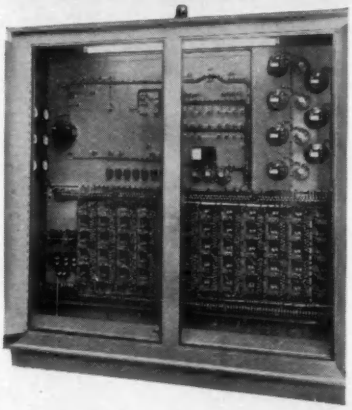

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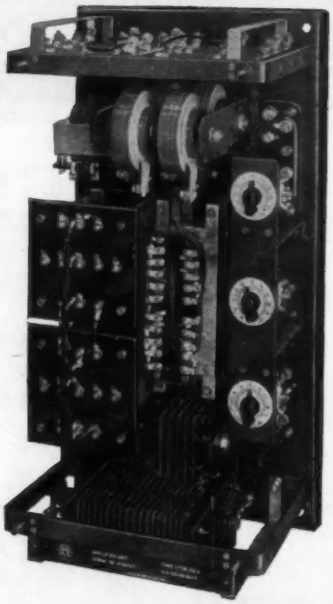

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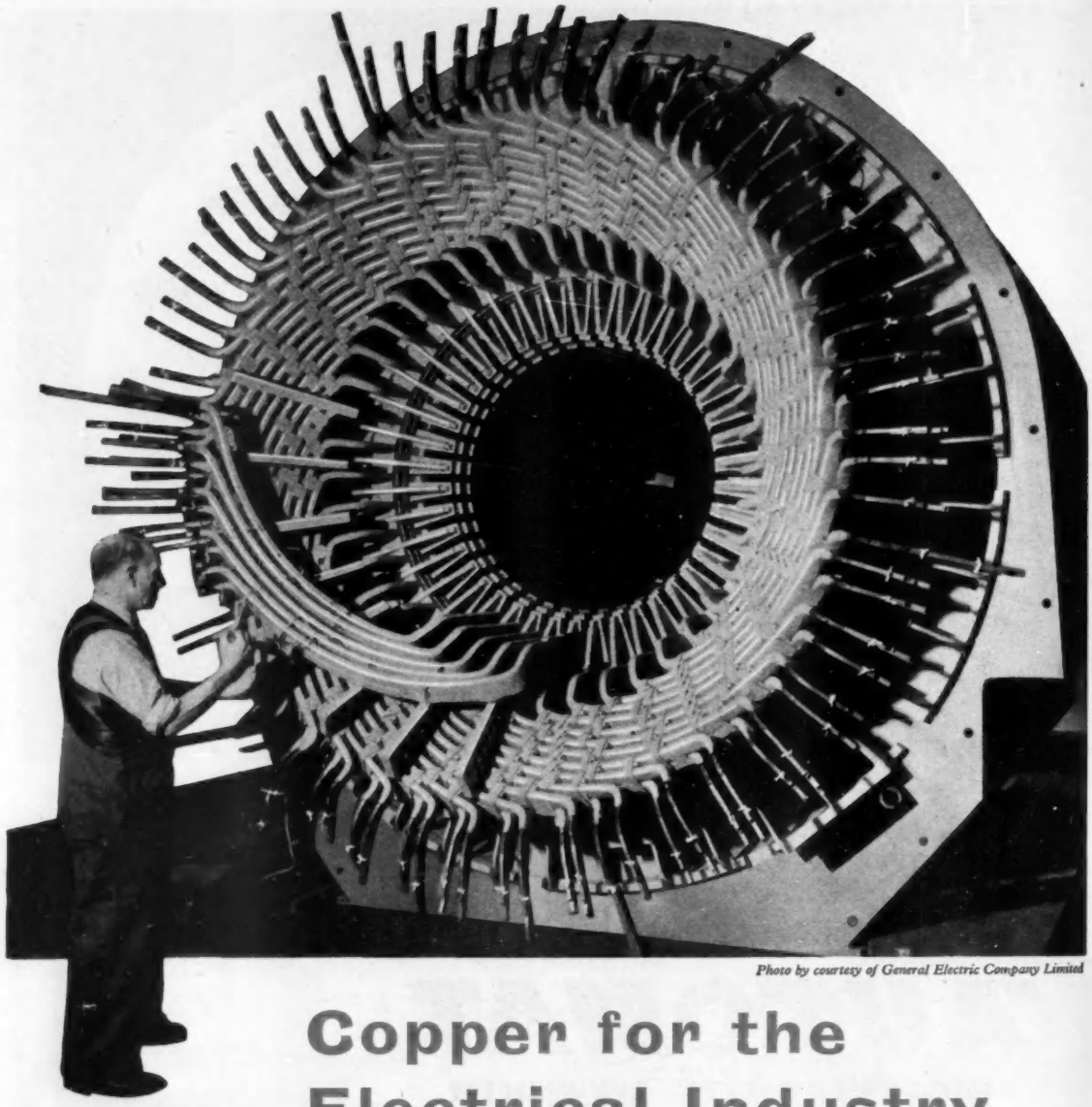

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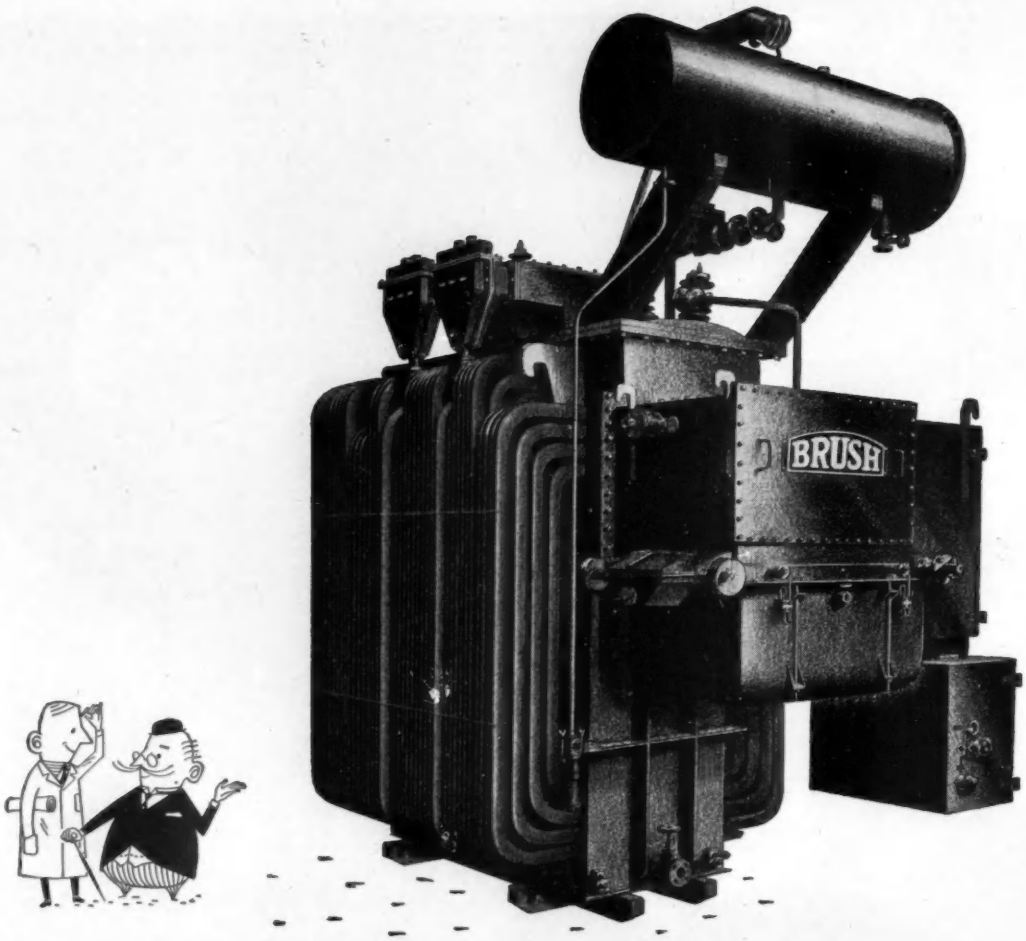

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16 MAY
1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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Reference is made to the recently announced agreement between the Nuclear Power Plant Co. and an Italian concern, paving the way for Britain's first export order for a nuclear power station, and some of the factors preventing more rapid expansion of nuclear exports are discussed

Induction Heating 909
The heat treatment and jointing of components usually causes an interruption in flow line production. This can be prevented, in many cases, by the use of induction heating techniques. Various examples of successful applications are included in the article

New Cathode-Ray Tube 915
In an I.E.E. paper this week Dr. D. Gabor, Mr. P. R. Stuart and Mr. P. G. Kalman, of the Department of Electrical Engineering, Imperial College of Science and Technology, described a flat, thin television cathode-ray tube which they have developed for monochrome or colour

Illuminating Engineering Conference 916
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Off-Peak Heating Conference 930
Organised by the Electrical Contractors' Association/South Wales Electricity Board Liaison Committee, a conference was held at Porthcawl last week to consider the development of off-peak heating

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✧ ✧ ✧ ✧

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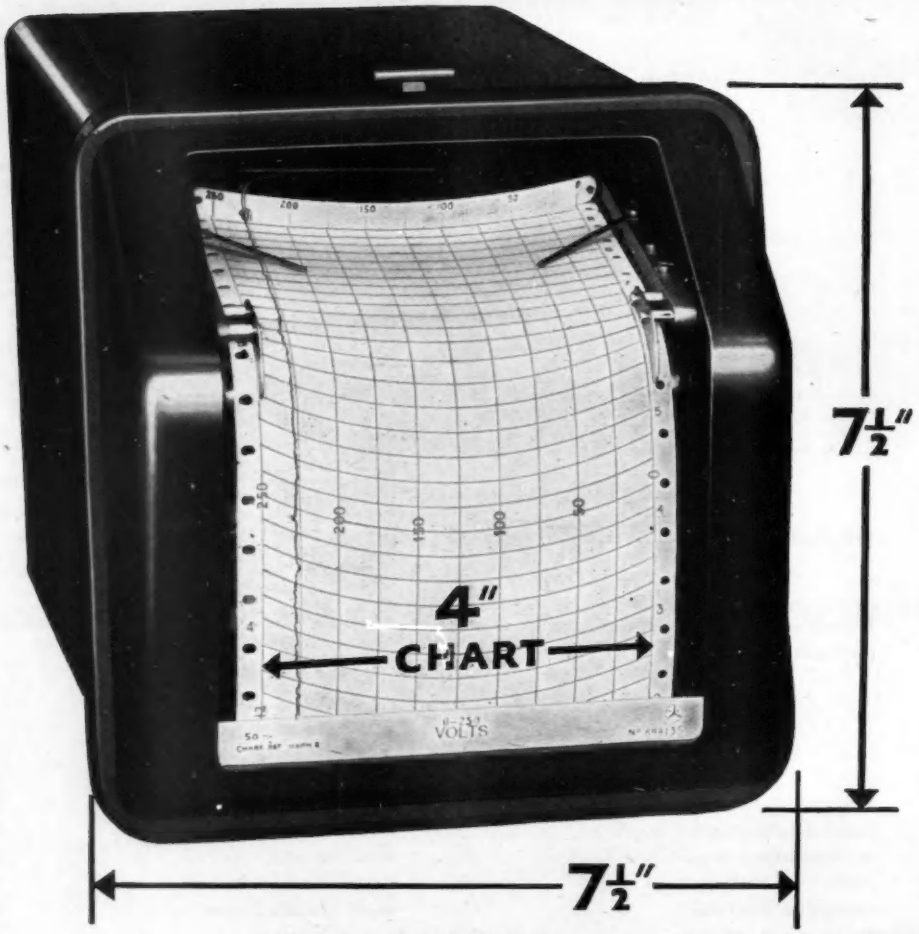

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ELECTRICAL REVIEW

16 May 1958 Vol. 162 No. 20 Established 1872

Nuclear Export Prospects

ACCOMPANYING the optimism and confidence that have contributed so much to the rapid design and construction of nuclear power stations in this country, there has been a certain disappointment at the slow development of the export trade in this promising field of power engineering. Britain's undoubted lead has not brought the rewards in export orders that were so freely predicted a year or so ago.

Before any charges of lack of initiative or of poor salesmanship are levelled at industry it is as well to consider whether complete nuclear stations, any more than complete conventional power stations, are ever likely to be a considerable part of our export trade. Circumstances and wise decisions taken at the right time led the Atomic Energy Authority to concentrate on the gas-cooled graphite-moderated reactor. This is also the reactor which British manufacturers are offering for export and where conditions are similar it should prove no less successful than at home. The leader of one consortium of manufacturers has said that they could now supply a nuclear power station of 1,000 MW.

The high capital cost of nuclear power stations is, however, a formidable obstacle to all but the most advanced countries. In practice it is also noticeable that most of the countries that are contemplating building a nuclear power station, or have announced a nuclear power programme, already have strong engineering industries. These countries are in fact no less anxious to augment their traditional sources of electricity than to acquire as early as possible the knowledge and experience that will enable them to construct, and eventually design, their own nuclear power stations, just as to-day they construct the more conventional plants.

Any delay in coming to a decision is understandable. For although the fuel and power positions of countries like Italy and Japan are no less pressing than our own, they are faced with a new technique, of which they have only theoretical knowledge, and they have to decide not only which of the many available reactor systems is likely to be the most efficient technically but which will be the best suited to their local conditions. Of the systems now available only the British has been adequately tried but some of the others hold promise of greater efficiency. Every effort should therefore be made to ensure that interested countries have all the information and help they need from British manufacturers and the Atomic Energy Authority. If we do not help there are others who will, and experience has shown that most countries in the end will reach their goal even without outside help.

Provided satisfactory financial arrangements are made the wisest course is to

co-operate fully from the outset. Thus the recent agreement between the Nuclear Power Plant Company and the Italian concern AGIP-Nucleare, which opens the way for Britain's first export order for a nuclear power station, may be expected to set a pattern for many future contracts in this field. It is also to be hoped that now that the ice has been broken there will be a steady flow of orders from other interested countries.

As Sir Claude Gibb has remarked, agreements of this type may mean that we have to forgo the supply of much plant that can be produced locally, but nevertheless "we can always hope to exert our influence by selling the fruits of our researches and brains." This is only another aspect of the generally changing pattern of world trade to which British manufacturers are having to adapt themselves. Provided a rigorous policy of research and development is followed at home, and other countries are fully informed of British progress and the engineering services available, the best prospects for nuclear exports would seem to lie in concentrating on the manufacture of those items that have the highest content of native skills.

NUCLEAR MARINE PROPULSION

A fortnight ago we reported comments in the annual report of Lloyd's Register of Shipping on the progress being made in the application of nuclear power to the propulsion of ships. We also referred to the model of a nuclear-powered tanker shown by Babcock & Wilcox, Ltd., at the Brussels Exhibition. Several groups have been established by the collaboration of nuclear power development companies and shipbuilders to study and develop the use of reactors in marine propulsion; the last reported is that being formed by Swan, Hunter and Wigham Richardson, Ltd., and the Nuclear Power Plant Co., Ltd.

So far the United States and Russia have set the pace in the use of nuclear power at sea, but there is every indication of this country's determination to catch up and overtake them—as befits the leading maritime nation. Although, as we said in our leading article of 2nd May, it is by no means certain that electrical transmission will be involved, several of the leading electrical companies are, and that is mainly why we are interested in these developments in the application of nuclear power.

E.D.A.'S VERSATILITY

It is noted in the 1957 report of the British Electrical Development Association that domestic advertising during the year "aimed at increasing the consumption of electricity." Lest it should be thought that this was a glimpse of the obvious—that it is E.D.A.'s principal job to do this—it should be remembered that in the immediately preceding period purely "promotional" work was difficult because of the Government's economy policy. The Association was forced back on to holding action and, as during the war, it concentrated on its educational and advisory services.

Off-peak use was the principal theme in the domestic propaganda put out during 1957 and many architects, consulting engineers and electric heating engineers were given information about off-peak space heating. Increased interest is being shown in lighting since the institution of the British Lighting Council of which E.D.A. is a founder member.

The report again illustrates the Association's versatility. Nowadays there is hardly any public activity into which electricity does not enter in one way or another and E.D.A. is always on the alert to make an appropriate contribution.

ELECTRICAL RESEARCH

When commenting at the annual luncheon of the Electrical Research Association last week (reported elsewhere in this issue) on the low ratio of the industrial contribution to the Government grant, namely, 2·4 to 1 as compared with up to 6 to 1 in other great research associations, Lord Hailsham, Lord President of the Council, said it could mean one of two things: either the electrical industry was not convinced that the Electrical Research Association could really serve a useful purpose, or manufacturers were allowing their contributions to lag behind their own co-operative needs.

To comment on only one of these suggestions, we know that the former can be ruled right out without a second thought. E.R.A. is doing remarkable work, indications of which were given in its recently published annual report reviewed in our last issue. A typical example of this is the collection of data on switching surges on overhead lines. The report on the work, which is to be presented at the next C.I.G.R.E. meeting, describes results obtained with an automatic three-phase cathode-ray oscillograph which was installed at three 132 kV sites and operated for an aggregate working time of two years. This, it is claimed, will be the most comprehensive account of automatic recording under normal working conditions that has yet been published.

AVOIDANCE OF TREE CLEARANCE

One of the biggest objections to the erection of overhead lines is the necessity for clearance in woodlands or even the mere cutting back of trees at beauty spots. A report in last week's issue (page 904) showed how the problem has been overcome by the South Western Electricity Board and British Insulated Callender's Cables, Ltd., in North Devon, where an insulated p.v.c. sheathed 11 kV cable with a catenary wire embedded in the sheath has been erected for public supply work without having to clear nearby trees or cut the wood back.

In this case the supply scheme is only a small one involving presumably a spur or branch line. But it has been the means of overcoming one of the countryside preservation difficulties with which so many distribution engineers are so closely concerned, admittedly at some extra capital cost. We imagine that the additional expense would be proportionately much greater for main line work where normally great clearances have to be made through woodlands, but even so the principle should be kept in mind, especially in the light of technical and economical developments in insulated overhead line work.

INDUCTION HEATING

Aids to Flow Line Production

By R. O'DONOGHUE*

THE production of components on a large scale introduces problems of handling and assembly, but when heat treatment and joining are involved, the problems become more acute. This is particularly so when hardening and tempering are traditionally carried out in a separate shop.

How far flow line production can be assisted by induction heating depends upon the specific application, but the advantages of cleanliness and absence of extraneous heat make the process eminently suitable for such work, and costly handling is avoided. In addition, many applications can be carried out by unskilled labour, the overall result being that production can be kept at an economical figure.

Operations

The subject of induction heating by high-frequency power needs no introduction, but it would be as well to mention the main treatments and processes that can be carried out and, where practicable, to compare them with traditional methods.

In the metallurgical field, hardening, tempering and annealing come readily to mind. Joining processes are represented by silver and soft soldering, while heating for forging and expanding components for shrink fitting are other applications from a very long list.

As a general rule, installations comprise a suitable high-frequency generator and a fixture. Two types of the latter are hand loading with automatic ejection and the incorporation of an induction heating process on one or more stations of an automatic transfer machine.

* Wild-Barfield Electric Furnaces, Ltd.

Rocker shaft hardening unit

As mentioned earlier, heat-treatment processes are frequently carried out in separate shops, with consequent long handling times from point to point in a production line. A further consideration is that in many cases only a portion of a component needs treating, but with normal furnace methods the whole has to be heated. Induction heating, however, enables localised treatment to be carried out, and where long slender parts are involved, there is a great reduction in the risk of distortion.

Brazing is frequently carried out in continuous furnaces, with the disadvantage that a considerable amount of energy is normally expended without return when the belt conveying the work cools upon emergence from the hot zone of the furnace. For such an application, the use of a gas torch may be more economical, but is generally disadvantageous due to the amount of brazing material expended. The same may be said of soft soldering when carried out by torch or iron.

In brief, high-frequency induction heating not only enables economies to be made in the power required to do a specific job where heat treatment is concerned, but its use also leads to savings in time and materials when applied to joining operations. Furthermore, as will be seen from the examples of installations that follow, high-frequency induction heating enables the treatment to be carried out in many cases in the actual production line itself.

Applications

It is probably true to say that of all industries, the motor industry has derived the most benefit from induction heating: it is certainly true that by far the most important of such processes in that industry is hardening. This particular application enables the inherent characteristics of the process to be used to the full, and advantage to be taken of the fact that components can be locally hardened on account of the rapid heat generation, and skin hardened as the heat is generated only in the outer surface.

Self-hardening plain carbon steels in the sorbitic condition are used wherever possible, that being employed to the greater extent, at least in Great Britain, being En 8D. This particular steel has a carbon content of 0·40/0·45 per cent and a manganese content of 0·7/0·9 per cent, and is suitable for water quenching. A surface hardness of 715 Vickers (59 Rockwell C) can be readily achieved without danger of cracking.

Carburised components are used in a number of cases, being locally hardened where necessary. This reduces cost considerably, as no copper plating or other stopping-off is required, the whole part being carburised. Alternatively, completely carburised components may be hardened all over by conventional methods and locally softened where necessary, for example, on threads, etc.

Adequate allowance for any final grinding, and a large core of steel unaffected by the hardening process are usually obtained with self-hardening steels when employ-

Induction soldering machine

ing hardened case depths of the order of 0·030 to 0·040in.

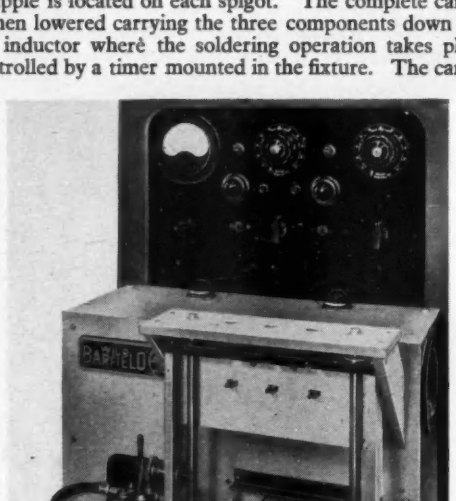
Apart from reduction of process time, there are other savings due to the use of induction heating for flow line production. Distortion is reduced in many cases, and thus grinding allowances can be cut down to produce shorter grinding times. In addition, scaling of a component is eliminated, there being only a thin oxide film adhering to the work after treatment.

Fig. 1 illustrates a fixture, generally referred to as a progressive hardening unit. It is employed for the progressive hardening of rocker shafts, the hardened bands being clearly defined. This is a particularly good example of the induction heating process being used in the production flow line as the components are delivered to the hardening machines by roller conveyor from the initial machining operations, and after hardening are transferred to the next operation, straightening, and thence to final grinding. The function of the operator is merely to place the shaft between centres and press the button to initiate the automatic cycle. The rocker shaft is carried up through the inductor at high speed and, at the top of the stroke, the component starts rotating and the quenching water is switched on, as the shaft is fed downwards at the pre-set hardening speed. The high-frequency power is automatically switched on and off to give the required pattern by means of a switch mounted on the fixture and actuated by a cam cut to the desired shape.

Of all the applications of high-frequency induction heating, that which effects the most spectacular savings in time and materials could well be silver soldering or soft soldering. The following is a typical example. A well-known firm installed an induction heating unit for silver soldering end plates into copper cylinders approximately 3in in diameter: they were previously hand soldered by flame. The output of a skilled hand brazer was six assemblies per hour, whereas one unskilled operator produced forty assemblies in the same time by induction heating. Furthermore, the much closer control and the use of preformed rings reduced the amount of silver solder used by approximately 50 per cent. With hand brazing, the number of rejects was often as high as 15 per cent due to the strict tests the components had to undergo: with the closely controlled induction brazed assemblies, rejects were reduced to less than ½ per cent. In terms of actual saving, that on labour amounted to £55 per week and on silver solder £75 per week. Additionally, there were the savings accruing from the virtual elimination of rejects.

Fig. 2 illustrates an installation for soldering nuts to the caps of automatic advance/retard mechanisms. The assembly set-up is quite simple. Separate caps and nuts are received by the operator and riveted together in a small toggle press. Rings of solder, prepared by winding cored solder around a suitable rod and cutting, are positioned over the nut, and the component placed upon the turntable which has a number of positions. Internal mechanism indexes the turntable to rotate to each position through the heating inductor coil and subsequently to an unloading position where the soldered components are automatically off-loaded into a chute. The solder is melted by heat conducted through the nut and, by capillary attraction, fills the gap between cap and nut to form an airtight seal. Production is of the order of 500 assemblies per hour. When comparison is made between the efficiency of one of these machines using the induction heating process and the results from hand soldering, the advantages are obvious. No skill is required on the part of the operator and completely satisfactory repetitive results are assured with the use of the minimum of solder. Most applications of silver and soft soldering by the induction heating process call for much simpler fixtures than the machine shown in Fig. 2, i.e. with hand loading and unloading.

An example of two-station operation is shown in Fig. 3. It illustrates a 3 kW induction heating unit arranged for soft soldering on the left-hand station and silver soldering on the right. The latter solders nipples to copper pipes, three components at a time. The cover has been removed from this illustration of the equipment in the loading position, so that the locating spigots may be seen raised through the inductor. A spring clip holds the top of each copper pipe when the assemblies are placed in position and a nipple is located on each spigot. The complete carrier is then lowered carrying the three components down into the inductor where the soldering operation takes place, controlled by a timer mounted in the fixture. The carrier



Two-station installation for silver and soft soldering

Flow line installation for soft soldering components

is raised at the end of the soldering operation, removing the components clear of the inductor and enabling them to be unloaded.

In the other station, nipples are soft soldered on to copper pipes, the nipple being slid over the end of the pipe and located approximately half-way along its length. The nests, which can clearly be seen in the illustration, accommodate five assemblies, which are soft soldered in one operation. This installation is a good example of a two-station set-up in which loading and unloading may be carried out in one station, while a heating cycle progresses in the other. Such an arrangement enables much better utilisation to be obtained from the induction heating unit.

Although on some joining applications it is possible to introduce a degree of mechanisation, by means of conveyor belts, etc., this is the exception rather than the rule. Complete mechanisation is rare for it is nearly always essential to use an operator for the fluxing and soldering operations.

Nevertheless, even bearing in mind the fact that operators are essential in the majority of cases, a very good degree of mechanisation can sometimes be achieved, and flow line production stimulated. An example of this is illustrated above. It depicts a production line in the works of a well-known manufacturer of gas meters. On each side of the central conveyor belt, a number of soldering operations is carried out, jointed components being carried down the line for assembly at a later point. The simplicity of this layout contrasts very much with a similar line with operatives using torches. Production showed a marked increase when high-frequency induction heating was installed, and that, moreover, with fewer operatives and a considerable saving in materials used.

The machines for induction heating which are illustrated are separate units performing operations on components either made elsewhere or by adjacent machine tools. The latest departure consists in mounting an induction coil in a station of a six-spindle automatic lathe for the production of rocker adjusting screws. The unit completely machines, burnishes, thread rolls, induction hardens and saw slots rocker adjusting screws at a gross production rate of 514 components per hour. The arrangement eliminates the necessity for a separate machine for the induction hardening operation and results in a completely machined and hardened component being produced from bar without any further attention.

Summary

Very many more examples of applications and induction heating equipments and installations could be cited. It is hoped that those chosen and dealt with will have conveyed broadly the possibilities attached to this technique, and that when these are taken in conjunction with the inherent characteristics of induction heating, cleanliness, rapidity, controllability and economy, a sound case will have been made out justifying the claim that the high-frequency induction heating process is indeed an aid in the field of flow line production.

Industrial Safety Conference

THE theme of the National Industrial Safety Conference held at Scarborough from 9th to 11th May was "Works Tidiness." The conference, which was organised by the Royal Society for the Prevention of Accidents, was attended by over 750 delegates, including many visitors from overseas countries. The chairman of the working sessions was Mr. H. E. Phillips, chief safety engineer of Vauxhall Motors.

The proceedings opened at the Spa Theatre with a civic welcome by the Mayor of Scarborough, Councillor R. Percy Robinson, J.P. The Society's president, Sir Howard Roberts, then gave the presidential address, at the end of which he presented the Sir George Earle Trophy, together with a commemorative plaque, to the 1958 winners—Imperial Chemical Industries, Ltd. The opening address was given by Dr. W. H. Garrett, personnel director, Monsanto Chemicals, Ltd. The subjects discussed during the conference included "Planning the Job for Safety," "Safe Handling and Lifting Methods," "Moving Things Safely about the Factory" and "Portable Means of Access." A trade exhibition included such items as machinery guards, protective clothing and goggles, barrier creams, fire alarm systems, etc.

I.E.E. Annual Report

THE report of the Council of the Institution of Electrical Engineers for the year ended 31st March last, presented at the 86th annual general meeting last week, shows that the total membership now exceeds 43,000, of whom nearly 23,000 are corporate members. A record number of applications was received during the year.

Meetings held in London and at the local Centres numbered 1,505, an increase of 40 compared with 1956-57. Ten ordinary meetings were held in London, with an average attendance of 243.

The following statement shows the membership of the specialised sections, the number of meetings that have been held and the average attendances:—

Section	Membership at 31st March 1958	Number of meetings	Average attendance (figures for last year in brackets)
Measurement and Control	3,043	15	92 (61)
Radio and Telecommunication	5,765	24	237 (152)
Supply	5,230	9	115 (147)
Utilisation	4,638	9	115 (120)

During the year 347 meetings of a general character were held by the ten local Centres, eleven Sub-Centres and eleven Specialised Groups. The Council regards this level of activity as very satisfactory and as reflecting great credit on the Committees concerned. The district meetings which have been held in many places throughout the country where membership of the Institution is too small to justify the provision of meetings of a more formal type have continued to be extremely successful.

The Committees of the 19 Graduate and Student Sections have continued their efforts to attract more members to their meetings, visits and social functions and many are reporting a noticeable improvement. A conference of hon. secretaries of Graduate and Student Sections was held in November and the suggestions made are being considered, with other matters, by the Committee on Graduate and Student Section Activities.

The Council has continued to implement its policy of stimulating recruitment to the electrical engineering profession by taking part in careers exhibitions and by showing the film "The Inquiring Mind" at schools in various parts of the country. A report on the Supply and Training of Teachers in Technical Colleges issued by the Minister of Education in May, 1957, and produced by a Committee under the chairmanship of Dr. Willis Jackson, vice-president, was discussed at an ordinary meeting held at the Institution on 7th November, when the Minister of Education and other representatives of the Ministry, of industry and of the teaching profession took part in the discussion.

The recognised routes in the electrical field for the education and training of professional engineers and engineering technicians have become more clearly defined (see "Professional Qualifications," by Mr. T. E. Goldup, *Electrical Review*, 19th July, 1957). For the professional engineer, the main alternative to the university route will become the industry-based sandwich diploma course leading to either the Diploma in Technology (Engineering) or the Higher National Diploma followed by a Part III course, and it is hoped that an increasing number of student apprentices will be granted facilities for following these courses.

Following upon the introduction of the Dip.Tech.(Eng.) and a revision of the standards of the Institution examination, discussions have taken place with the Ministry of Education regarding the future of the Higher National Diploma and Higher National Certificate in Electrical Engineering, as a result of which a joint statement has been made. The most important points are that in future all courses for Higher National Diplomas in Electrical Engineering will be professional in character and will be of three years' duration with a standard of entry indicated by credits in all subjects of the Ordinary National Certificate or by a General Certificate of Education with passes in five subjects including mathematics and physics, one of the latter having been passed at advanced level, and the other studied to the same level. These Higher National Diploma courses will be planned to give exemption from Parts I and II of the Institution examination. A further course of six months' full-time study or two years' part-time study will be necessary to cover the work of Part III of the Institution examination. Where this course and the studies which precede it are on a full-time basis, they will generally lead to a diploma or associateship of the College at which they are undertaken.

The Examinations Committee has substantially completed its reassessment of qualifications and courses by which candidates can be exempted from the Institution examination under the standards laid down in the 1957 Examination Regulations. During the year attention has been directed to a number of overseas qualifications. Graduates in electrical engineering, at first degree level, of certain universities in the United States may now satisfy the educational requirements by passing Part III of the Institution examination.

The accounts show that the total expenditure for the year was £205,604 of which the major group item "Management" was £115,618. The total income was £206,791 of which subscriptions represented £174,963. The excess of income over expenditure was therefore £1,187.

I.E.B. and Parliamentary Privilege

LAST week the Judicial Committee of the Privy Council announced its decision on the point referred to it by the Committee of Privileges of the House of Commons after that Committee had considered a matter raised by Mr. G. R. Strauss, Labour M.P. for Vauxhall.

Mr. Strauss had written to the Paymaster General criticising the methods adopted by the London Electricity Board in the disposal of its scrap metal. Thereupon the Board threatened to institute proceedings for libel. Mr. Strauss raised the matter in the House of Commons and it was referred to the Committee of Privileges which later reported (see *Electrical Review*, 22nd November, 1957) that the Board had acted in breach of Parliamentary privilege.

The Committee had doubts, however, about the interpretation of the Parliamentary Privilege Act, 1770, and the Judicial Committee of the Privy Council was asked to examine the point. That Committee has now ruled that the House of Commons "would not be acting contrary to the Parliamentary Privilege Act, 1770, if it treated the issue of a writ against a Member of Parliament in respect of a speech or proceeding by him in Parliament as a breach of its privileges."

In delivering the judgment Viscount Simonds stressed the fact that the Judicial Committee was concerned only with the specific point put to it. The Committee expressed no opinion whether the matter in question was a "proceeding in Parliament" nor whether the mere issue of a writ would be a breach of privilege in any circumstances.

Atomic Power Station for India?

FROM OUR NEW DELHI CORRESPONDENT

TUCKED away in the President's address to the budget session of the Indian Parliament was a brief item about the possibility of India's building her first nuclear power station before the end of the Second Five-Year Plan. This was not taken seriously until Dr. H. J. Bhabha, the chairman of the Indian Atomic Energy Commission and, for all purposes, the guiding spirit behind the nuclear development programme of the Indian Government, himself addressed a private session of Parliament members presided over by Mr. Nehru, who is also the Minister in charge of atomic energy. Dr. Bhabha's address dwelt on some of the basic problems of India's energy development with special reference to her hydro-electric potential and estimated coal reserves. The address was in effect a simplified version of his paper read at the Dublin meeting of the British Association for the Advancement of Science last September.

It has been estimated that, as in most other undeveloped countries in Asia, Indian consumption of primary energy, viz. coal, water power and oil, is about one-third of her total energy consumption. India has over 500,000 villages with no other source of power than cattle dung, and it has been estimated that about two-thirds of the cattle dung is made use of as fuel for cooking and other domestic purposes. In urban areas, where only one-fifth of the total population lives, most people burn firewood and charcoal, although recently some of the coal-based derivatives such as soft coke have been making some headway. Of primary energy, coal is by far the most important one, constituting over 80 per cent of the total consumption. In 1957, India produced 42·7 million tons of coal, which is almost one-third higher than her production ten years ago. Hydro power, the installed capacity of which is rising faster than that of thermal power, contributed about 6 per cent; the rest, about 14 per cent, was taken up by petroleum products, about a third of which was kerosene, used mostly in villages for lighting.

Generating Plant Programme

The installed capacities and output of thermal, hydro and diesel power stations from 1953 to 1956 are given in the table. When the Second Five-Year Plan began (*Electrical Review*, 6th April, 1956), the installed capacity of all power stations was 3·6 million kW, and the total output about 11,000 million kWh. By the end of the Plan, the capacity is to be raised to 6·8 million kW and the total generation to over 22,000 million kWh. Even when this is accomplished, the country as a whole will be short of power to the extent of at least 3 million kW of installed capacity. When presenting the demands of

INDIAN POWER PLANT AND PRODUCTION

	1953	1954	1955	1956
Installed Capacity (MW):				
Steam	1,394	1,491	1,547	1,596
Hydro	731	793	939	1,062
Diesel	180	209	209	228
Total	2,305	2,493	2,695	2,886
Generation (million kWh):				
Steam	3,573	4,058	4,618	5,134
Hydro	2,914	3,237	3,742	4,295
Diesel	210	227	232	233
Total	6,697	7,522	8,592	9,662

Dr. H. J. Bhabha, chairman of the Indian Atomic Energy Commission (facing the camera), in the control room of India's first experimental reactor, "Apsara"

the Ministry of Power and Irrigation recently, Mr. S. K. Patil, Minister of Power, said that by the end of 1961 the demand would rise to over 10 million kW. In fact, it has been stated by the Government that the power programme forms the core of the Five-Year Plan, and no matter what the difficulties are, the programme will be put through, if not actually improved upon.

Of the total of 3·4 million kW of increased capacity planned for 1961, about 2 million kW will be hydro power, 1·35 million kW thermal, and the rest diesel power. The total hydro capacity will thus be about 3 million kW, that of coal-burning power stations about 3·55 million kW and the rest (a small proportion of the total) diesel power. The increase in hydro capacity will be of the order of 200 per cent, and in thermal stations about 40 per cent. There is a tendency in India to go in for multi-purpose projects in preference to single-purpose power projects, and most of the hydro projects are essentially irrigation schemes with power as a by-product.

India is importing food to the extent of over £100 million a year which adds to her foreign exchange difficulties and jeopardises the Five-Year Plan. The policy of the Nehru Government is to direct capital towards such economic activities as will help to reduce the foreign exchange commitments, and food is given high precedence. Although, therefore, the capital requirements of hydro power per kilowatt are normally higher than those of thermal power, the general policy is to invest in multi-purpose river valley projects in preference to purely thermal stations.

But there are regions where there is neither hydro power nor coal or where the hydro power potential has been completely developed. In the south, for instance, the State of Madras has almost completely harnessed its reserves of hydro power and has now to fall back upon thermal power for which it has only second-grade coal deposits (lignite). On the west coast, the Ahmedabad

region has neither water power nor coal, so that the extension of its present power system has become a rather difficult economic problem. Over 80 per cent of India's coal is mined in Bengal and Bihar, over 800 miles from the industrially active regions on the west coast. Although the pithead prices of Indian coal are fairly low—about 30s a ton for the best quality—the long distance from the collieries adds almost twice as much to the pithead price, which favours the idea of a nuclear power station. Indian railways are working under a tremendous traffic pressure and a nuclear power station, it is stated, would relieve the pressure on railways and, to that extent, help the general national economy.

Dr. Bhabha is of the opinion that, in or near Ahmedabad, a nuclear power station of about 150 MW capacity to start with, would be an economic proposition. The snag, however, is the probable load factor which, unless the existing power system were to be operated for peak load only, would not be more than 40 to 45 per cent. This would result in a unit price for power of at least 1·5 times that from coal-burning stations. The latest report of the Atomic Energy Commission (which has now been reorganised with Dr. Bhabha as chairman without executive or administrative commitments in order to give him more time to attend to technical and research problems) refers to small-sized power stations with capacities of the order of 30 to 40 MW, but no technical details are available.

Meanwhile, the Commission is busy with its programme of thorium and uranium processing, and with the production of heavy water for which a plant is being set up at Nangal, near the Bhakra project. It is most unlikely that a nuclear station will be commissioned before the end of the Second Five-Year Plan, but the Indian energy situation being what it is, a nuclear programme of some considerable magnitude is not ruled out for the Third Five-Year Plan, when, it is stated, the difficulties of capital formation will not be as acute as they continue to be at present. Apart from the Canadians, who are helping in the construction of an NR-X type reactor at Bombay, no other foreign power has shown much interest in India's atomic energy programme. The Russians, for instance, seem to be more interested in the petroleum exploration programme than in Dr. Bhabha's atomic energy plans.

BUSINESS COMPUTERS IN AMERICA

AT a meeting of the Measurement and Control Section of the Institution of Electrical Engineers on 6th May a lecture on "Some Case Histories of Business Computers in the U.S.A." was given by Dr. A. T. Starr, M.A., B.Sc., M.I.E.E. He said that, for various reasons, users of computers were reluctant to divulge what savings they achieved. However, it was possible to tell them what they ought to be saving. One of the smaller type computers would cost about £45,000 to install, and £10,000 might be spent on a survey of business procedure, flow charts, and so on. At 15 per cent the annual cost would be about £7,500. The machine should replace 50 clerks (salary £25,000) by three clerks (salary £1,500), two programmers (salary £3,000) and one maintenance engineer (salary £2,000 per annum). There was, thus, an annual saving of £11,000 on the initial outlay. Electronic business machines were, therefore, excellent investments if made with care and skill, but could result in a heavy loss if the approach was haphazard.

Employees and Automation

In the course of his lecture, Dr. Starr gave details of the use of computers in the United States, including the "Magnatronic Reservisor" employed by American Airlines to deal with seat reservations and the "IBM 702" used by the Bank of America, California, for loan accounting. He said it was often held that Americans, both management and workers, welcomed the introduction of automation unreservedly. That view was wrong. He quoted the remarks of Mr. Cohen, of the Office Employees' Union, to the effect that the Union was very much concerned about certain aspects, including a method of transition which would provide the greatest amount of protection to the largest number of workers and have the minimum adverse effect on the economy as a whole. Nevertheless, American management was introducing office automation at a good rate; and the attitude of the workers could not be used as an excuse for the dragging of feet in Great Britain. The cause of British slowness was probably conservatism and lack of incentive on the part of management. It was perhaps due in part to penal taxation.

As to the view that some British installations had been ill-conceived and the results had been disappointing, his opinion was that, in America, business methods were treated much more seriously than they were in Great Britain and the Americans took a much more professional view of the subject than we did.

In reply to Major Fuge, who asked what savings might be attributable to the greater accuracy of information obtained from the computer and the fact that the training of numerous staff could be dispensed with, Dr. Starr said that he had no information on the first point, but training might be a factor in favour of the use of computers, for it might take less time to introduce an intelligent worker into a computer office than it would into an ordinary office.

Mr. W. Bamford asked what was being done in the United States in respect of small firms of 500-1,000 employees, and whether anything was being done for such firms in Britain. Dr. Starr said that very little was done for small firms, except that certain firms hired out computer time on request. Small firms could not look to a great deal of office automation to begin with; it was much better for medium and large firms to be dealt with because their savings were very much greater.

In reply to Mr. Boggis, Dr. Starr said that the problem of translating information into machine language was difficult. One would like to do it without punched cards. An interesting problem arose in connection with the banks; standardisation of cheques as to size and shape was discussed twenty-five years ago, but that aim had not yet been achieved.

Replying to Mr. Davis, Dr. Starr said he had no doubt that in the next five or ten years the reliability of computers would be considerably improved, and there was also no question that costs would be considerably reduced. The main problem was to design the use of the systems and to determine their point of entry into a business. It was difficult to introduce a completely new business procedure. He would unhesitatingly say that the failures which occurred were attributable to that factor and not to the imperfections of the computer.

Mr. Webb, in proposing a vote of thanks to Dr. Starr, said that the advent of the electronic computer would have a significant impact upon all of them. The new technique had to be grafted on to existing business methods, and no doubt in the course of time those business methods would themselves change, adapting themselves to the new techniques. Much re-thinking would be necessary, and it would be bound to have its repercussions on technical methods.

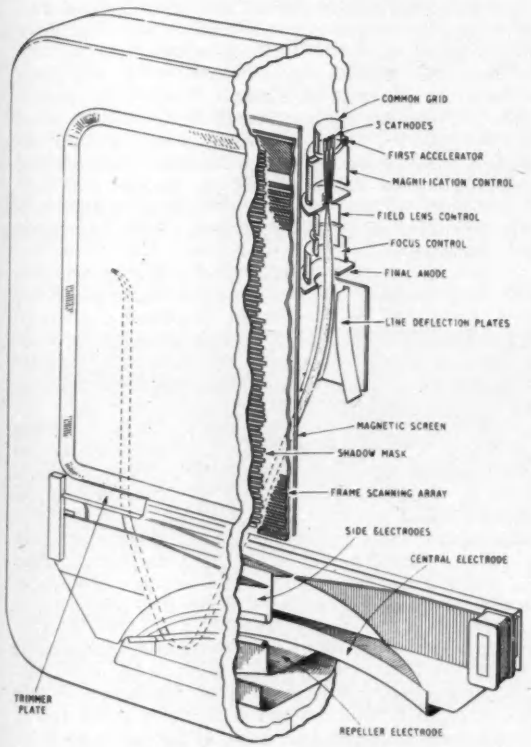
NEW CATHODE-RAY TUBE

Flat Design for Monochrome and Colour Television

AT a meeting of the Radio Section of the Institution of Electrical Engineers in London on Wednesday a new cathode-ray tube for monochrome and colour television was described in a paper presented by Dr. D. Gabor, F.R.S., Dr. P. R. Stuart and Mr. P. G. Kalman, all of whom are in the Department of Electrical Engineering, Imperial College of Science and Technology, University of London. This cathode-ray tube is novel in that it is flat and has a thickness of only about one-quarter of the screen diagonal.

The development of this tube, which has been carried out by the authors under the sponsorship of the National Research Development Corporation, has now reached a stage at which the feasibility of every one of its novel features has been tested singly, and partly in combination. The major part of the work consisted in the development of the electron-optical system. This is a three-beam electron gun, a line deflector system, an electrostatic reversing lens and a magnetic collimator which launches the three colour beams into the space between the phosphor screen and the scanning array, on three accurately parallel and equidistant planes, and ensures focusing along any scanning line without "dynamic" corrections. The second part of the development was concerned with a scanning array which enables the beam to effect the frame scan by itself. The third part of the work involved devising a simple method for producing the pattern of colour-phosphor strips, in automatic register with the shadow mask which is fixed immediately on the glass screen.

Gabor-N.R.D.C. colour television tube



The first two developments were tested in combination, and the third, for the time being, only on small samples of colour screens. Work was also done on the use of pre-stressed (toughened) glass plates, to permit the construction of large tubes of at least 20in diagonal with plane screens, without excessive glass thickness. All experiments were carried out in continuously-pumped demountable vacuum tanks. No sealed-off complete tube has been produced so far, and the authors feel that this stage of the development would be more appropriately carried out in industrial establishments than in an academic laboratory.

When this new tube is in operation the electron beam (or three beams issuing from the same gun in the case of a colour tube) is launched vertically downwards. A line-deflection system imparts to it a pendulating motion in a vertical plane, and a reversing lens turns this plane through 180 deg, increasing the deflection angle by a factor of about four. Just before reaching the screen region the beams are turned into the vertical direction by a magnetic collimator. The beams now enter a narrow space between the phosphor screen and a "scanning array," consisting of parallel horizontal conductors, arranged in a plane parallel to the screen. At a certain level the beam is thrown against the phosphor screen by an electric field which travels downwards at the speed of the frame scan. This travelling field is produced by the beam itself, which, in the intervals between line scans, falls on the conductors of the array in a narrow zone, discharges them, and thereby pushes the field to a lower level. Recharging of the array after the frame is also effected by the electron beam, making use of the secondary emission of the array conductors. This is the principle of self-scanning.

Colour is produced by shooting three beams on parallel lines and close together into the screen region. The deflecting field between screen and array acts as an efficient short-focus lens, and unites the three beams in one small spot at the screen, which they approach at different angles. Colour discrimination is produced by a line shadow mask about 0·5 mm only from the screen, and fixed to it by means of small invisible bridges. This also serves as a mask in producing the colour-phosphor strips by a powder setting process in air.

I.E.E. Scottish Centre

THE spring meeting of the Scottish Centre of the Institution of Electrical Engineers will be held from 23rd to 26th May at the Pitlochry Hydro Hotel. The programme will include a golf competition for the Hutcheson-Winning Cup, a visit to the hydro-electric scheme at Errochty power station of the North of Scotland Hydro-Electric Board and an evening theatre visit to the Pitlochry Festival Theatre. The inclusive charge for the whole meeting is £6 15s per person, and for a shorter period 47s 6d per day. Applications to attend should be made to Mr. J. H. P. de Villiers, hon. secretary, c/o Bruce Peebles & Co., Ltd., 19, Waterloo Street, Glasgow, C.2.

The president, Mr. E. B. Sawyer, speaking at the opening session

Illuminating Engineering Conference

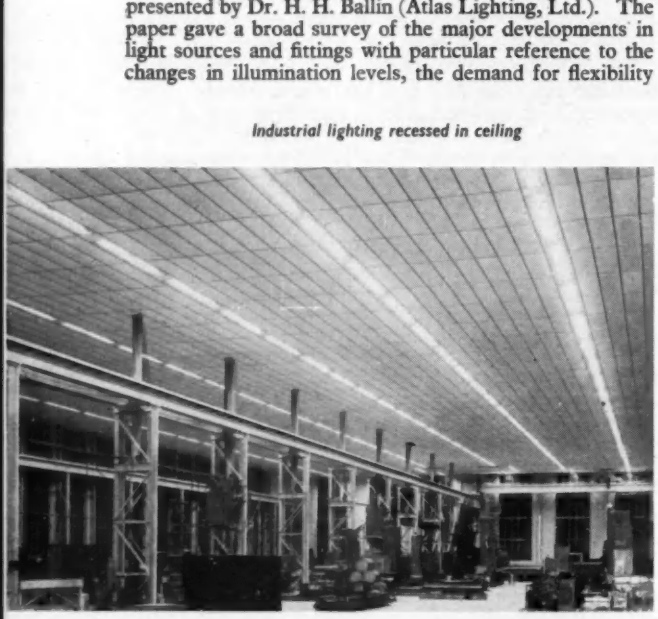
SUMMER MEETING AT EASTBOURNE

THE biennial Summer Meeting of the Illuminating Engineering Society was held at Eastbourne this week from Sunday to Wednesday under the chairmanship of Mr. E. B. Sawyer, president of the Society. The following are abstracts of the six papers which were presented; the discussions will be reported in our next issue.

Lighting Trends

On Monday afternoon, after the official opening by the Mayor, a paper on "Lighting Trends since 1945: A Survey of Industrial, Office and Shop Lighting" was presented by Dr. H. H. Ballin (Atlas Lighting, Ltd.). The paper gave a broad survey of the major developments in light sources and fittings with particular reference to the changes in illumination levels, the demand for flexibility and the tendency to integrate lighting into the building structure.

Industrial lighting recessed in ceiling



The steady increase in efficiency and life, coupled with drastic reductions in the price of hot cathode fluorescent tubes, had led to a phenomenal fall in the cost of lighting which had progressively opened new fields to fluorescent tubes, and was one of the main reasons for the achievement of higher standards of lighting in this country.

There had been no major changes in the design or performance of tungsten filament lamps, but whereas some ten years ago the question could be seriously asked whether fluorescent tubes would not eventually supersede them, it was now accepted that incandescent lamps would always have their own important part to play. In 1956 a pink lamp had been introduced for domestic and social application, but in spite of its appeal it had so far made little impact.

Illumination levels in industry had risen very considerably since the war. A lower limit of 6 lumens/sq ft had been established by the Factory Regulations of 1941. The I.E.S. Code of 1945 had recommended levels of between 10 and 20 lumens/sq ft for work of ordinary character, but the 1955 edition showed increases in values approximating to 60 per cent.

Good factory layout was designed to achieve maximum production efficiency, and might be completely changed from time to time. Whilst a general lighting scheme could cater for changes in layout it was unsuitable for changes which involved reallocation of space between factory, warehouse and office accommodation, each with a different illumination level. There had been a need for a flexible lighting system, and the development of lighting trunking in the early 1950s had provided the answer.

Attempts to improve office illumination levels after the war had often consisted of merely inserting higher wattage lamps in existing fittings. Sometimes simple 80 W fluorescent batten fittings had replaced 75 W or 100 W lamps in age-darkened opal bowls. The resulting glare,

Dr. H. H. Ballin

Mr. D. Shellshear

Mr. C. D. Cartwright

Mr. A. L. Hogg

Mr. C. Dykes Brown

Mr. W. R. Stevens

due to the doubling or trebling of illumination level, had given rise to complaints about the harmful effect of fluorescent lighting, particularly in drawing offices.

During the immediate post-war years commercial fittings with one or two 80 W fluorescent tubes had been the rule for shops. Even to-day, many shops were lit in this manner though there was a growing tendency towards tungsten filament lamps for special displays. Luminous ceilings had not, so far, been much employed for the lighting of large showroom areas, partly, no doubt, because there was a danger of monotony from a uniformly bright ceiling.

Glassware for Lighting

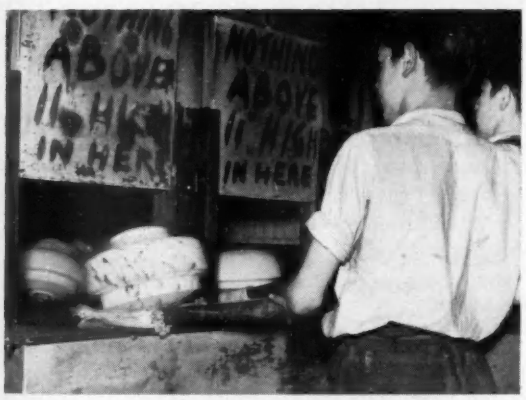
In their paper "Design and Production of Glassware for Lighting," which was read on Monday afternoon, Mr. D. Shellshear (Troughton & Young (Lighting), Ltd.) and Mr. C. D. Cartwright, B.Sc. (Stevens & Williams, Ltd.), said that the raw materials for ordinary glass and the methods and utensils used, had varied very little over the years, but there had been changes in the furnaces for melting the glass. The latest development was the melting of glass by electricity alone.

After blowing, the glass had to be annealed to avoid all stresses and strains that might have been set up during cooling. Originally, this had been done by placing the glasses in ovens, but to-day the continuous belt system through a lehr oven was employed.

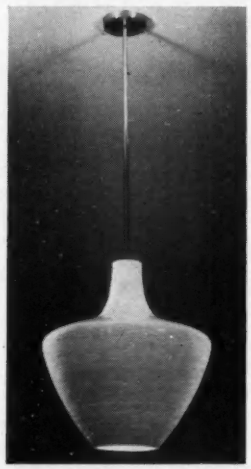
The authors then gave an account of the actual glass blowing processes. As a final aid to the glass blower's craftsmanship, moulds were provided and had changed little over the years except that they were now made with much greater precision. The vast majority of them were in two or more pieces and were made of cast iron, machined on the inside to the required shape of the glass, leaving an opening in the top.

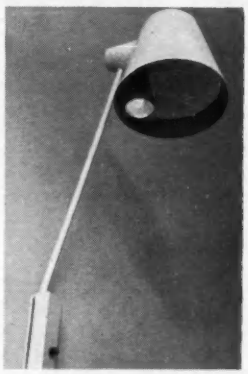
A limited amount of decorative engraving, cutting, sand-blasting, etching and embossing was still done, perhaps more on the Continent than in Britain, but it was generally confined to simple lines and masked work to provide the artistic result in an economic way. The simplest way to apply decoration was to spray with a form of coloured lacquer, but although this finish was economic, it was not very durable. Permanent decoration had always been achieved by the application of ceramic enamels. These were being used more and more, and they undoubtedly presented the greatest scope.

The problems associated with the design of glass lighting fittings included the dissipation of heat, the assembly of the glass and associated components, ease of production and of maintenance, and reasonable cost.



Lighting glassware being put into the lehr oven for annealing




Above: Finnish bed lighting fitting. Left: A blown glass in flashed opal with a yellow ceramic pattern designed and made in Britain

The fitting had also to be designed to direct the light where it was needed, cut down excessive brilliance and be decorative.

Developments in Finland

The first paper on Tuesday, entitled "Lighting in Finland," was presented by Mr. E. Paivarinne (Helsinki). He said that the electric lamp industry in Finland was relatively young and it was not until the middle of the 1920s that the first incandescent lamps had been manufactured. Since that time development had gone rapidly forward and at present about 900 types and sizes of incandescent lamps were made. Compared with 1939, lamp production had been trebled. The first Finnish hot cathode fluorescent lamps had been introduced in 1947.

For the general lighting of factories with low ceiling heights, ordinary 2×40 W louvred fluorescent fittings of white steel or aluminium were mainly used. Most offices were now provided with direct/indirect 2×40 W louvred fluorescent fittings. The fitting with specular aluminium

side reflectors had gained most popularity. This had a very low luminance in the direct glare zone and each row of desks was generally illuminated by its own row of fittings. Indirect lighting or luminous ceilings were seldom used as a means of diminishing the disturbing effect of indirect glare or shadows. Both were expensive, and the luminous ceiling was difficult to maintain.

The 125 W and 250 W colour-corrected mercury lamps were now coming into use for lighting main streets in the larger towns. When improving the illumination of old streets, the previous diffusing incandescent fittings were still used for the mercury lamp. In new suburban streets normal colour-corrected mercury lamps were used in cut-off reflectors of anodised aluminium. The spacing of poles was intended to be kept between 30 and 35 metres. Fluorescent lamps were little used in outdoor installations because of temperature difficulties during the winter. On main roads leading into towns, 140 W sodium lamps had also been used.

Exhibition Lighting

The paper on Finnish lighting practice was followed by one by M. André Boereboom (Ministry of Public Works and Reconstruction, Belgium) entitled "Lighting at the Brussels 1958 Exhibition." He said that throughout the Exhibition the lighting of buildings, pavilions, parks, gardens and fountains played a very important part. Lighting could give such an event a characteristic atmosphere and indeed enabled technicians and designers to display their skill.

The techniques used in an exhibition such as this represented the *avant garde* and gave inspiration for several years to come. This was certainly true of architecture and was probably true of lighting.

The total capacity of the electrical installations exceeded 60 MW. The experience of the 1935 Exhibition had shown that the maximum quarter-hourly load had been approximately half the total transformer installed capacity. The system had therefore been calculated for a maximum quarter-hourly output of 25 MW, but was capable of taking an additional demand of 20 per cent. Power was obtained from the thermal power station of Interbrabant, situated 4 km from the Exhibition, at 11 kV, three-phase, 50 c/s. The l.v. networks operated at 220 V, but approximately 90 per cent of the energy was supplied at high voltage. The proximity of the Interbrabant station to the Exhibition had called for the provision at each intake of a three-phase reactor, reducing the short-circuit power from 800 MVA to 250 MVA; this made it possible for consumers to make use of 250 MVA cut-outs of normal design.

At Grosvenor House Hotel, London, each bed has an adjustable light and there are two ceiling mounted fittings (not shown)

The lighting of the pavilions by the countries concerned served for general illumination of the Exhibition. Where the pavilions were too far apart, a fitting made of formed extruded cellulose acetate had been adopted; it housed six 40 W tungsten filament lamps and was mounted on a 4 metre galvanised metal post. The posts were normally spaced at 20 metres apart. In other places, and in particular the wooded parts, lighting was provided by projectors lighting the mass of greenery. Glare was avoided by placing the projectors in concrete pipes buried in the ground, or by fitting screens or louvres. Depth and relief effects were obtained by placing certain projectors behind the trees so as to silhouette them against a background of light.

The paper concluded with detailed descriptions of some of the Exhibition lighting, including the fountains.

Lighting and Architecture

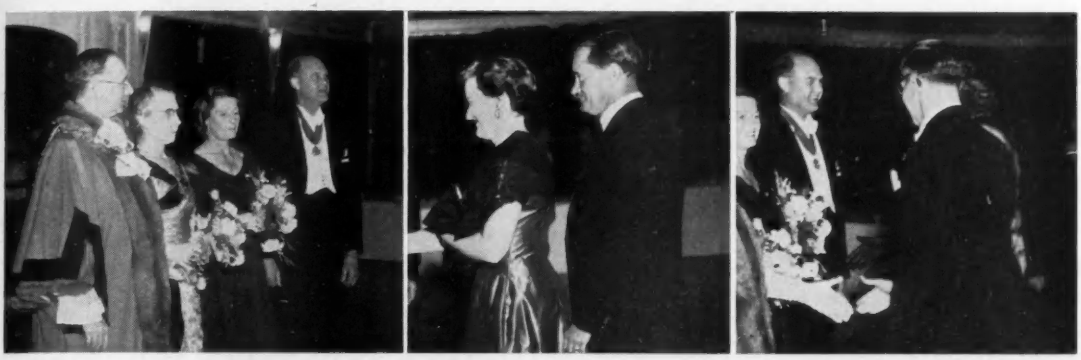
An interesting definition of architecture as "shelter with grace" was given on Wednesday morning by Messrs. G. Grenfell Baines, A.R.I.B.A., and A. L. Hogg, A.M.I.E.E. (Grenfell Baines & Hargreaves), in their paper "Lighting and Architecture." Both old and new buildings needed light to reveal their forms, but whereas the high spaces of old buildings could absorb a certain amount of "pollution" by hanging objects, the reduced spaces of modern buildings were more suited to built-in lighting. But the visual effect of fittings during the day was as important as their use at night.

While imitations of daylight were to be condemned, there were many spaces which looked extremely well in daylight yet seemed to lack all life and cohesion when lighted at night. Light coming in from outside was, of course, directional and so more effective in revealing form, but light sources inside a space, especially when they were designed to produce even illumination, would by absence of shade conceal form. Variety and unidirectional light went together, dullness and multi-directional light went together. Lighting had to aim at defining the junctions between surfaces rather than blurring them. Perhaps the worst illustration of light and shade destroying surface character was that provided by the suspended shallow bowl which gave rise to shadows sweeping from wall to ceiling and cutting of the corners of both, thus destroying the effect of surface and form.

Perhaps the most significant development of built-in lighting was the louvred ceiling, virtually a lighting fitting equal to the whole area of the room. The principal effect of this was to almost destroy any sense of enclosure. This might be accepted under certain conditions. Complete lighting of ceilings seemed to be most appropriate in foyers, vestibules and similar spaces which linked the inner rooms of the building with the outer air. The paper concluded with a reference to collaboration between the architect and the lighting engineer.

Hotel Lighting

The last paper presented, "Character and Compromise in Hotel Lighting," was given by Messrs. C. Dykes Brown, M.I.E.E., and W. R. Stevens, B.Sc., M.I.E.E. (G.E.C.). The paper noted that many things affected a guest's judgment of a hotel. One of the most important, and certainly the one which made the first major impact, was appearance. Immediately on entering the hall an impression



Left: The Mayor and Mayoress of Eastbourne with Mr. and Mrs. E. B. Sawyer. Centre: Mr. and Mrs. F. L. Cator, delegates from Johannesburg, South Africa. Right: Mr. and Mrs. Sawyer, Dr. H. H. Ballin and Mrs. Ballin

was formed which would influence all subsequent impressions. Did he find elaborate chandeliers hanging from a lofty ceiling and rich carpets on the floor? Was the character the so-called "contemporary" with bright colours and "free-arrangement" groupings of lights? The visitor would probably not analyse what he saw but he would form a lasting impression of the hotel. Of the many details which created character, it was obvious that lighting took an important place with decoration and furnishing.

It was profitable, therefore, to spend money on lighting and to take trouble with it. There were, however, many limits on what could be done reasonably in a hotel, as in all other lighting installations. Initial cost was an obvious one. Maintenance was another serious matter. In a hotel of about 100 bedrooms with the associated public rooms, there might well be 2,000 lamps. Almost all of them would be incandescent lamps and the average burning hours about 12 a day; thus some two dozen lamps would fail each day. In a factory, a few unlighted lamps did not present a serious problem; in a hotel a single failure might be as unattractive as a missing tooth.

In view of the economic advantages of tubular fluorescent lighting much more attention should be paid to its use in hotels. Not only would energy be saved but the frequency of lamp replacement would be reduced. Cold cathode tubing had advantages in hotel installations since the life might well exceed 25,000 hours.

In considering lighting requirements, the authors divided the hotel into two parts, namely, the guest and the staff areas. The staff areas were mostly working places such as kitchens where efficient use was the aim and decorative effects were relatively unimportant. It was possible to make fairly definite recommendations for these workrooms since in all of them the "seeing task" was known and the lighting methods could follow well-established practice. The guest areas, however, presented much more difficulty, sometimes because the visual requirements were not easy to define, as in a lounge, sometimes because the prime need was for a decorative result at reasonably low cost. In these areas the need for compromise was most important and it was not possible to lay down hard and fast rules of procedure. However, the authors discussed some typical solutions both for interiors and exteriors.

An appendix was included in the paper giving a simple approach to design based on the apparent brightness techniques.

E.T.U. CONFERENCE

THE annual delegate conference of the Electrical Trades Union will open on Monday next at Morecambe and end on 23rd May. The agenda includes 21 motions on the electrical contracting industry and 22 on the electricity supply industry, some of which will no doubt be arranged into composite motions.

The growing concern with redundancy in the contracting industry is expressed in a motion from London Central No. 1 Branch. It requests that a redundancy agreement should be negotiated with the National Federated Electrical Association to provide for joint consultation between management and shop stewards before dismissal notices are given; dismissals to be discussed on the basis of the work available to the employer; and a ban on overtime. Two further motions ask for a sick pay scheme and a superannuation scheme, while a third wants a tool allowance for all electricians employed in the industry.

Of the motions on electricity supply, three deal with apprentices. One desires wider training facilities. Another "deplores the fact that boys are still being recruited into the contracting departments as juniors other than apprentices with no regard to proper training" and it urges the abolition of what it describes as "this form of cheap labour." The third motion wants apprentices' pay brought up to the standard of the building trade. A motion on contracting "views with concern the ever-growing practice of district managers of the Boards to sub-contract work to private contractors, thereby threatening members of the supply industry with possible redundancy."

On wages, one motion calls for a complete survey of the wages structure, "with a view of being brought into line with the N.J.B. Agreement," while another considers that a wage increase could be granted out of profits and advertising costs.

One motion on nationalisation rejects the Labour Party's scheme for the State purchase of shares in industry, while another calls upon the Labour Party to declare its support of nationalisation of all the industries necessary to the "interest of the people."

The Executive Council's report to be presented at the conference gives the usual review of its work during the past year, and covers the main industries in which the E.T.U. has negotiating rights or is a party to the negotiating machinery.

PERSONAL AND SOCIAL

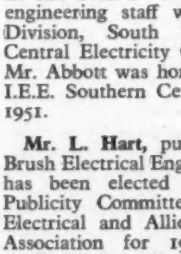
News of Men and Women of the Industry

Mr. A. Abbott, M.I.E.E., has been appointed to the headquarters staff of the National Coal Board as head of Electrical Engineering, Central Engineering Establishment. After serving a works apprenticeship with Ferranti, Ltd., and Ferguson Pailin, Ltd., on switchgear erection, Mr. Abbott rejoined Ferranti, Ltd., on grid construction work in S.E. England. He became assistant engineer in N.W. England with Landis & Gyr, Ltd., in 1932, being responsible for the installation of grid metering equipment, and in 1935 he joined the Manchester Corporation Electricity Department as a technical assistant on work associated with additional generating plant and 33 kV extensions. In 1939 he joined the senior engineering staff of the General Electric Co., Ltd., Witton, on protective gear and switchgear development, and he became an assistant engineer on C.E.B. work with Merz & McLellan at their Newcastle office in 1945. Since nationalisation of the supply industry he has been a senior member of the engineering staff with the Southern Division, South Western Region, Central Electricity Generating Board. Mr. Abbott was hon. secretary of the I.E.E. Southern Centre from 1949 to 1951.

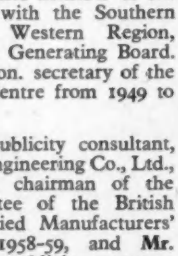
Mr. A. Abbott

Mr. L. Hart, publicity consultant, Brush Electrical Engineering Co., Ltd., has been elected chairman of the Publicity Committee of the British Electrical and Allied Manufacturers' Association for 1958-59, and **Mr. C. T. M. Bagnall,** publicity manager, English Electric Co., Ltd., has been elected vice-chairman.

Mr. Hart joined the Brush Electrical Engineering Co. in 1934 as publicity manager, which appointment he held until January of this year when he was appointed publicity consultant. During his period of service with the company he has also handled the publicity of a number of companies associated with the Brush Co. He has been a member of the B.E.A.M.A. Publicity Committee since 1945.



Mr. L. Hart



Mr. C. T. M. Bagnall

Mr. Bagnall was elected to serve on the Publicity Committee in 1952. As publicity manager of the English Electric Co. he is responsible for publicity at home and in many overseas territories for the produots of all the company's divisions.

The Institute of Fuel has elected **Mr. T. C. Bailey,** sales manager (industrial fuels), Shell-Mex & B.P., Ltd., to become president in October next year.

Mr. S. B. Hartshorne, A.M.I.Mech.E., M.S.A.E., has been appointed chief engineer of Henry Meadows, Ltd., Wolverhampton. He joined the company in 1935 and after serving an engineering pupilage has successively held positions of design development engineer, chief development engineer, and assistant chief engineer.

Mr. S. B. Hartshorne

Mr. L. Goodall, M.I.E.E., deputy sub-area engineer of the North Staffordshire Sub-Area of the Midlands Electricity Board, has been appointed Sub-Area engineer, and will take up his new duties on 1st June.

Mr. Goodall has spent the whole of his career in the electricity supply industry in North Staffordshire. He was educated at Longton High School and Hanley Technical School and joined the Stoke-on-Trent Electricity Department in 1918. He became first assistant engineer in 1941 and in 1944 was appointed distribution engineer and deputy manager, which position he held when the industry was nationalised in 1948. He became deputy Sub-Area engineer of the North Staffordshire Sub-Area shortly after the M.E.B. was established. Mr. Goodall was chairman of the North Staffs. Sub-Centre of the I.E.E. for 1950-51.

Mr. R. C. Hesketh-Jones, LL.B., who was formerly sales director (industrial division) of British Oxygen Gases, Ltd., has been appointed chief executive (overseas) at the head office of the British Oxygen Co., Ltd., in which capacity he will handle the overseas affairs of the group in direct association with the managing director, Mr. T. E. Potts.

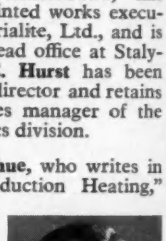
Mr. R. J. Foster, D.F.C., A.F.C., M.A., who has recently been director and general manager of British Oxygen Aro Equipment, Ltd., succeeds Mr. Hesketh-Jones as sales director, and **Captain Q. P. Whitford,** O.B.E., A.M.I.E.E., R.N. (retd.), who is taking charge of the Aircraft Equipment Works at Harlow, will in future be closely linked with the activities of British Oxygen Aro Equipment, Ltd. He was formerly quality control manager of British Oxygen Gases' Equipment Division at Edmonton.

Mr. N. H. Townend has been appointed publicity manager of Quasi-Arc, Ltd. After five years in industry as a metallurgist, Mr. Townend joined the General Electric Co., Ltd., and for the past two years has worked on Press relations for its Atomic Energy Division. Mr. Townend will be at Quasi-Arc's head office at Bilston, Staffs.

Mr. G. Clay has joined Bailey Meters & Controls, Ltd., as assistant sales manager.

Mr. J. Irwin, M.I.Prod.E., has recently been appointed works executive director of Aerialite, Ltd., and is at the company's head office at Stalybridge. **Mr. C. C. Hurst** has been made an executive director and retains his position as sales manager of the aerial and electronics division.

Mr. R. O'Donoghue, who writes in this issue on "Induction Heating," joined the Technical & General Advertising Agency, Ltd., as a copywriter after serving in the Royal Artillery from 1939 to 1945. Later he became publicity manager with J. Collis & Sons, Ltd., until his present appointment in 1945 as publicity manager with Wild-Barfield Electric Furnaces, Ltd.



Mr. R. O'Donoghue

The golf day of the **Electrical Industries Club** will be held on 27th May at Highgate Golf Club. The open greensome competition, in which guests may take part, will be held in the morning and the Stableford competition for the Benn Cup in the afternoon. Applications to take part in these competitions should be made by 20th May to Mr.

J. J. Thompson, Berry's Electric, Ltd., 85-86, Newman Street, London, W.1. An Electrical Industries Club *v.* Birmingham Electric Club golf day will be held on 18th July at Frilford Heath, near Oxford.

The annual ladies' night of the **Ipswich and District Electrical Association** will be held on 14th November at the Royal Hotel, Clacton-on-Sea, and the Association's annual dinner will be held on 6th February next at the Great White Horse Hotel, Ipswich.

The **Midlands Radio Industry Golfing Society** held its monthly meeting at Moor Hall Golf Club, near Birmingham, recently. This was a medal competition for the McMichael Cup and was won by Mr. J. Francis with Mr. V. W. R. Smytheman as runner-up.

Mr. W. Armour, who until recently has been in charge of the "Maxlume" lighting section of the Glasgow branch of Veritys, Ltd., has been appointed by the company as manager of the newly formed "Alux" Division which will have its headquarters at Brettenham House, Lancaster Place, Strand, London, W.C.2.

Mr. W. Armour

At the annual general meeting of the Association of British Ebonite Manufacturers, held on 1st May, **Mr. A. W. Hopkins** of the General Electric Co., Ltd., was re-elected chairman for 1958-59.

Switchgear & Equipment, Ltd., held their annual dinner and dance on Friday last at Wincott's Ballroom, Banbury. Mr. A. G. H. Oxley (managing director) presided and during the evening he gave many instances of his intimate knowledge of the men who work under him. There were 250 members of the staff and guests present, the latter including many representatives of the various Electricity Boards with whom the company conducts a large proportion of its business.

Mr. Oxley, in a short speech, paid a tribute to the staff and workpeople, and he also welcomed the guests, expressing in particular his pleasure at the presence of Mr. P. de'E. Stowell (chief engineer, Merseyside & North Wales Electricity Board), and Mr. J. Lombard (chief engineer, South Wales Electricity Board). He was also glad to welcome members of the staff from Scotland who were attending for the first time.

A humorous interlude in the proceedings, and one which indicated the esteem with which Mr. Oxley is held by the staff, was the presentation to him of his "apprentice's certificate," a crown (bowler hat) and mace (one of the company's insulators mounted on a pole). Mr. D. A. J. Oxley (director) expressed the hope that his father would not be retiring for some time to come.

Mr. A. G. H. Oxley (managing director) speaking at the annual dinner of Switchgear and Equipment, Ltd. Mr. J. Lombard (South Wales Electricity Board) is on the left of the picture and Mr. P. de'E. Stowell (Merseyside and North Wales Electricity Board) on the right

On Saturday morning, many of the guests visited the company's Banbury works, and were entertained to luncheon.

The golden jubilee of the foundation of the Telecommunications Group of the **General Electric Co., Ltd.,** was celebrated by a dinner at Claridge's on 6th May. Mr. R. E. Robinson, assistant managing director, G.E.C., presided, and the guest of honour was the Postmaster General, Mr. Ernest Marples, M.P., who proposed the toast of the group.

Mr. Robinson, in responding, recalled that the G.E.C. became the first British firm to manufacture telephone exchange equipment when it founded the Peel-Conner Telephone Works in 1908. The first order received from the Government was for a 14,000-line exchange for Glasgow, which was completed in two years and served the city from 1910 until the G.E.C. replaced it with an automatic exchange in 1942. In 1909 the company obtained its first export order, for an exchange for Hawthorne, Melbourne, Australia, and this equipment was still in operation. The Peel-Conner Co. transferred its activities to Coventry in 1920, and the group now employed between 14,000 and 15,000.

Mr. Leslie Gamage (chairman and managing director, G.E.C.) proposed the toast of the guests, to which Sir Ben Barnett (chairman, Commonwealth Telecommunications Board) replied. Among the guests were: Brig. Sir Lionel Harris (Engineer-in-Chief, G.P.O.), Sir Archibald Gill (former Engineer-in-Chief), Sir Norman Frome (partner of Preece, Cardew & Rider), Mr. R. J. P. Harvey (Deputy Director-General, G.P.O.), Mr. D. Lusk (partner of Preece, Cardew & Rider), Mr. K. Anderson (Deputy Director-General, G.P.O.), Mr. S. B. Warder (chief electrical engineer, British Railways) and representatives of the Crown Agents for Overseas Governments, the Colonial Office, Australian Post Office, Singapore Telephone Board, Nigerian Commissioner's Office, B.P., Ltd., and the Hong Kong Telephone Co.

Mr. Sebastian Z. de Ferranti has been appointed managing director of Ferranti, Ltd., as from 9th May. **Sir Vincent de Ferranti** remains chairman of the company.

Mr. Sebastian Z. de Ferranti

Mr. R. T. Rutt, chief assistant organiser / designer to the British Electrical Development Association, has been appointed exhibition and display organiser to Willing & Co. Production, Ltd. Mr. Rutt joined E.D.A. in 1948. He takes up his new appointment on 1st June.

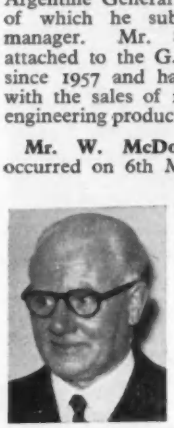
OBITUARY

Mr. R. W. Gregory.—The death is reported of Mr. Richard Walter Gregory, M.I.E.E., A.I.H.V.E., M.Cons.E., senior partner of R. W. Gregory & Partners, consulting engineers, Newcastle-on-Tyne. Mr. Gregory, who was seventy-five, was educated at Finsbury Technical College and received his training with the Newcastle-on-Tyne Electric Supply Co. From 1903 to 1933 he was with Merz & McLellan, first as technical assistant to Bernard Price and later as chief electrical engineer and partner. Mr. Gregory was chairman of the North Eastern Centre of the I.E.E. for 1925-26 and again in 1941-42.

Mr. John Dudley Smith, a European sales representative of the General Electric Co., Ltd., died suddenly in Bad, Nenndorf, West Germany, on 5th May. He was in Germany attending the G.E.C. exhibition stand at the German Industries Fair, Hanover. Mr. Smith joined the G.E.C. in 1919

as an engineering pupil apprentice at its Erith works. He was transferred to Witton in 1921 to gain further experience and after serving for a short time at the company's head office in London he went to Buenos Aires as an engineer with the Anglo-Argentine General Electric Co., Ltd., of which he subsequently became manager. Mr. Smith had been attached to the G.E.C.'s Erith works since 1957 and had been concerned with the sales of nuclear power and engineering products.

Mr. W. McDonald.—The death occurred on 6th May, at St. Mary's Hospital, Paddington, after a short illness, of Mr. W. McDonald, managing director of the Hackbridge Cable Co., Ltd. Mr. McDonald, who was sixty-five, had been associated with the electric cable industry since 1907. He commenced his career with Johnson & Phillips, Ltd., and joined the Hackbridge Cable Co. in 1915 and completed fifty years in the cable industry. In later years he was managing director of both the Hackbridge Cable Co. and the Bryce Electric Construction Co. He was also a founder director of Hackbridge Holdings, Ltd.



The late Mr. W. McDonald

Mr. A. Clerk.—The death has occurred at Elgin of Mr. A. Clerk, manager of the North of Scotland Hydro-Electric Board's North Caledonia Area.

Mr. Clerk graduated in electrical engineering at Glasgow University, after which he was engaged with Balfour, Beatty & Co. in the supervision of grid line construction work in central England. In 1953 he moved north to assist with the erection of the first distribution lines from the Grampian Electricity Supply Co.'s hydro-electric station at Loch Luichart and, when these lines reached Nairn and Forres, transferred to the company as resident manager. When the Grampian Co. undertaking was vested in the North of Scotland Hydro-Electric Board Mr. Clerk was appointed area manager for the North Caledonia Area and assumed responsibility for the undertakings at Inverness, Buckie, Lossiemouth and Peterhead.

Mr. E. P. S. Cattle, A.M.I.E.E., of Higgins & Cattle, Ltd., died on 8th May at the age of seventy-six.

Mr. Cattle entered the electrical contracting industry in 1898, with Messrs. Strodes and served with them until he joined Higgins & Griffiths, Ltd., in 1905, with whom he became senior engineer and manager. In 1934, with Mr. Higgins, he formed the present company, Higgins & Cattle, Ltd. During the course of his career Mr. Cattle was responsible for important electrical installations in the City of London, and other parts of the country. He was also responsible for many innovations with regard to the use of special cables, conduits and conduit and duct systems, which are still in use.

Hambidge Memorial.—Shortly after the death of Mr. J. J. Hambidge, chairman of the British Vacuum Cleaner & Engineering Co., Ltd., in December last it was decided by a committee of the "Goblin" organisation to create a fund for a Hambidge Memorial. This memorial takes the form of a portable altar which was presented to the Leatherhead Hospital on 8th May. The dedication ceremony was performed by the Rev. Canon Page, M.A., Vicar of Leatherhead, and took place in the works canteen of the company.

WILLS

Mr. J. S. Peck, M.I.E.E., formerly a director and chief electrical engineer of the Metropolitan-Vickers Electrical Co., Ltd., who died on 17th October last, left estate in England valued at £47,961.

Mr. C. R. Lovatt, A.M.I.E.E., Congleton district engineer to the Midlands Electricity Board, who died on 24th September last, intestate, left £5,240 gross (£3,299 net).

Mr. L. Falk, formerly chief designer to Transformers (Watford), Ltd., who died on 6th December last, left £3,276 gross (£3,062 net).

Mr. C. O. Milton, Maidenhead Borough Council's first electrical engineer, who died on 19th December last, left £7,692 gross (£7,632 net).

Mr. R. A. S. Boyton, O.B.E., M.I.E.E., formerly general manager of the Antrim Electrical Supply Co., who died on 16th August last, left personal estate in England and the Republic of Ireland valued at £9,664.

Mr. E. D. Phillips, editor and manager of the *Mining Electrical and Mechanical Engineer*, 1920-47, who died on 23rd January last, left £2,575 gross (£2,490 net).

Mr. J. S. Swift, personal assistant to the chief of research at the Marconi research station at Great Baddow, who died on 21st December last, intestate, left £7,908 gross (£7,803 net).

Mr. H. R. Waddington, director and former joint managing director for many years of Gent & Co., Ltd., who died on 10th January last, left £38,375 gross (£38,158 net).

Mr. W. J. Bransom, A.M.I.E.E., chairman of Read & Partners, Ltd., who died on 24th January last, left £21,493 gross (£21,135 net).

Mr. H. T. Barden, electrical contractor, who died on 20th November last, left £32,998 gross (£28,449 net).

Queensland Commission's Capital Investment

Over the next ten years it is estimated that the capital requirements of the Queensland State Electricity Commission will rise from about £12 million to £27 million per annum, and the figure for the whole of the period is put at more than £190 million. A substantial part of this expenditure will be on the provision of additional generating plant.

Recommendations have already been made for the installation in South-Eastern Queensland of additional plant to meet demands until 1966, with a new power station to be in service by 1967, involving an expenditure of approximately £67 million. In Central and North Queensland investigations are continuing.

The principal construction developments during 1957 in South-Eastern Queensland were the installation of additional plant in the Bulimba and Tennyson power stations, and the commissioning of a second 110 kV transmission line from Abermain to Postman's Ridge. In the Wide Bay-Burnett Region the first 15,000 kW generating set was put into service at the Howard power station. In the Capricornia Region a second 15,000 kW set was installed and a 66 kV transmission line from Biloela to Theodore and Cracow is nearing completion. The newly-formed Mackay Regional Board has already made considerable progress in accelerating the rate of development, and the construction of the transmission line from Mackay to Proserpine is well advanced. In the Cairns Region the Tully Falls hydro-electric project was officially opened on 21st September, 1957, and is now in service with two 18,000 kW turbines installed.

In all other parts of the State steady progress has been made, and the growth in many of the small western towns since electricity supply was established has been notable. Last year electricity consumption throughout the State increased by 10·6 per cent and 26,000 new consumers were connected.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £180 0s 0d
COPPER, H.C. Electro	ton £180 0s 0d
Fire Refined 99·70%	ton £179 0s 0d
Fire Refined 99·50%	ton £178 0s 0d
COPPER Tubes	lb 1s 8¼d
Sheet	ton £205 10s 0d
H.C. wire and strip	ton £228 15s 0d
LEAD, English	ton £72 15s 0d
Foreign	ton £71 0s 0d
MERCURY	flask £76 0s 0d
TIN, block (English)	ton £732 10s 0d
ZINC, G.O.B. Foreign	ton £62 5s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 5⅝d
Sheet	ton —
Wire	lb 2s 3½d
PHOSPHOR BRONZE Wire	lb 3s 6½d
PLATINUM	oz £25 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 21⅛d—21⅜d

PARLIAMENTARY REPORT

Rating Proposals

When the Local Government Bill was considered on report, the House of Commons agreed to several drafting amendments put forward by the Government to the Schedule dealing with the rating of the electricity supply industry. They had the effect of changing the Bill to provide that for the purposes of the Schedule the generating capacity for any one year should be taken to be "the installed capacity or aggregate installed capacity, that is to say the maximum amount of electricity, as certified by the Board, capable of being generated in the station or stations in question at the 31st day of March falling next but one before the beginning of that year; and the said maximum amount shall be certified on the footing that all generators which were installed at any 31st day of March were capable of being fully used at that time."

An Opposition amendment to restore full rating of industrial premises (in the Bill the proportion of rates to be paid by industry is increased from 25 to 50 per cent) was negatived by 235 votes to 202.

Mr. Bevins, Parliamentary Secretary, Ministry of Housing and Local Government, said that industry's share of the total rate burden under the new arrangements would be three times what it was in 1955 and commercial premises would bear a share increased by 7 per cent, whereas the householder's share had fallen by 10 per cent during the past three or four years.

The Government agreed that it was desirable to give local authorities a greater sense of financial independence, and there was no doubt that full re-rating of industry would be a step in that direction. But this could not be viewed in isolation. It must be considered in the light of the general economic situation. If full rating were restored, industry would have to pay rates of well over £57 million or the equivalent of a 2 per cent wage increase over the whole range of manufacturing industry, or of a 2½ per cent increase in the total import bill of industry. At a time when the Government was pledged to stabilising price levels, it would be folly to add to industry's burdens to this extent.

Safety of Nuclear Power Stations

Mr. Palmer asked what general directions had been given to the Central Electricity Generating Board in the national interest to minimise radioactive danger, under conditions of breakdown or maloperation, from the large nuclear power plants now under construction by the Board.

Sir Ian Horobin replied that no directions had been given. The reactors were designed in close consultation with the Health and Safety Branch of the Atomic Energy Authority and a formal code of practice was being drawn up to ensure safety in operation. The Government also intended that these reactors should be subject to licensing and inspection under the proposals he had outlined on 10th February.

Questioned further, he said that none of these stations would be charged with fuel for something like two years and the proposals outlined in the House would have been settled long before then.

Tax on Oil Heaters

The Chancellor of the Exchequer (Mr. Heathcoat Amory) informed Mr. Ridsdale that the estimated amount of revenue from purchase tax on electric and gas fires and oil heaters in 1958-59 was about £4½ million, of which oil heaters accounted for about £1½ million.

Mr. Ridsdale said the proposed tax on oil heaters would fall chiefly on those hardest hit by inflation and rising prices. He asked the Chancellor to look at the proposal again.

Mr. Amory said the object of the proposed change was to remove the anomalies and discrimination against electric and gas heaters. The matter could be fully discussed on the Finance Bill.

Marchwood Smoke Emission

Replying to Mr. John Howard, the Parliamentary Secretary, Ministry of Power (Sir Ian Horobin), said that special precautions including the use of neutralising substances were taken in operating the furnaces at the Marchwood power station to minimise the acid content of the flue gases and local measurements of acid concentration did not reveal any significant increase since the station began operation. As to the effects of the smoke, he understood that some near-by property had suffered minor corrosion, mainly of paintwork. There was no evidence of harm to human beings.

Quality Standards

Miss Burton asked the President of the Board of Trade whether he had further considered the suggestion that guarantees and certification marks advertised to the public should be registered and adequately inspected.

Mr. F. J. Erroll, Parliamentary Secretary, said the registration of guarantees would in itself neither help a purchaser to enforce a contract nor ensure that they were of positive value, and it would be impracticable for the registrar to decide by inspection the merits of any guarantee.

Miss Burton also asked for a further statement concerning the response made by manufacturers to proposals by the Consumer Advisory Council of the British Standards Institution on standards of quality.

Mr. Erroll replied that there had been no important developments since this matter was raised in February, but he understood that current discussions with manufacturers were proceeding satisfactorily.

Purchase Tax and Prices

Questioned again about the extent to which reductions in purchase tax were being passed on to the public, Mr. Erroll said he had considered the examples which Mrs. Mann had sent to him. In at least one case the complaint seemed to be due to a misunderstanding, because the tax was levied on the wholesale value of the goods and the retail price would be lowered by a smaller percentage. In other cases, it appeared that the price reductions which had been made had not reflected the whole of the reduction in tax, possibly because the manufacturers had taken the opportunity to make increases in price which would have had to come anyway because of higher costs. He had seen nothing to suggest that action of this kind had been widespread.

Use of Ordnance Factories

In an adjournment debate on the proposed transfer of the Dalmuir Royal Ordnance factory to private industry, Mr. Cyril Bence said that if Babcock & Wilcox wanted only a part of this factory, there was no reason why the Ministry of Supply should not retain part of the factory for the manufacture of atomic energy equipment.

Mr. W. J. Taylor, Parliamentary Secretary, Ministry of Supply, said it was not the Government's intention to keep redundant ordnance factories in operation for undertaking civil work. Only a very substantial and expanding industrial concern like Babcock & Wilcox would be in a position to take over a factory bodily and to offer new employment to a large number of the workpeople. The Ministry's aim, and that of the Babcock & Wilcox management, was to introduce new work to dovetail with the rundown of Service orders.

Abandonment of Restrictive Practices

Questioned in the House of Lords about the working of the Restrictive Trade Practices Court, the Lord Chancellor, Lord Kilmuir, said that notices of court proceedings had been issued in respect of 70 agreements. Of these 23 had been abandoned, either by determination or by the removal of all the restrictive provisions. The Registrar had also been informed that the parties to certain other agreements were taking steps to abandon them.

Electric Vehicle Report

AT the end of 1957 electric vehicles in use on the roads of Great Britain and Northern Ireland numbered 23,868 driver-seated vehicles and 10,984 pedestrian-controlled vehicles—a total of 34,852. These figures are given in the report of the Electric Vehicle Association of Great Britain presented at the annual meeting held in London on 8th May. The report stated that in the early part of the year the problems of fuel rationing caused by the Suez crisis, and the difficulties which ensued for traders in the delivery of goods, resulted in increased interest being taken by transport users in the merits of the electric vehicle. As a result of negotiations with the Ministry of Transport on the subject of "L" drivers of electric vehicles, new regulations came into force on 1st October, 1957, under which the holder of a provisional licence, driving an electrically-propelled goods vehicle up to 16 cwt unladen weight, not constructed to carry more than one person, need not be accompanied by a qualified driver. New registrations during 1957 totalled 2,817, of which the largest class was the 1 to 1½ ton (unladen weight) type, 585; there were 482 in the 16 cwt to 1 ton class, and 459 in the 12 to 16 cwt class. In addition, there were 184 pedestrian-controlled vehicles, and 443 invalid vehicles.

Mr. J. A. Lowe (Westinghouse Brake & Signal Co.), chairman, asked why if private traders and trading organisations found electric vehicles an economical proposition, did not some of the nationalised bodies whose delivery problems were not dissimilar? They were very tolerant, and optimistic, industry in that they felt sure that the growth by 2,000 electric vehicles per year would be greatly accelerated by their adoption in large numbers by the nationalised industries. Over the past few years they had seen encouraging signs from the British Transport Commission and the Post Office. They felt sure, also, that the various Electricity Boards would extend their use of electric vehicles.

Sir Wavell Wakefield, M.P., was elected president for the fifth year in succession. The new chairman is Mr. J. H. Cansdale (British Thomson-Houston Co., Ltd.), the vice-chairman is Mr. E. Powell (Chloride Electrical Storage Co., Ltd.), and the hon. treasurer is Mr. H. E. M. Bull (S.E.V. (Sales & Services), Ltd.); Mr. J. I. Bernard (director and secretary, E.D.A.) is secretary and Mr. R. D. Reynolds (E.D.A.), deputy secretary.

Artificial Fibres

IN a lecture to the Utilisation Section of the Institution of Electrical Engineers last week Dr. P. T. Standring recalled that about 80 years ago, Sir Joseph Swan, who had been searching for a filament for the electric lamp, had taken out a patent for the production of artificial filaments made from a nitro-cellulose solution. In 1885 Swan had given an exhibition in London of fabrics and garments made of the fine filament he had produced but, in practice, he found considerable technical and production difficulties with the result that, in England, the process was never used as the basis for a textile fibre, but was restricted to the making of carbonised filaments for electric lamps.

Swan had, however, established two principles that were essential for the production of artificial filaments, said Dr. Standring. The first was that one must dissolve a natural fibre in such a way as not to destroy its fibrous nature; and the second was that in order to produce a filament from the "glutinous mass," one had to extrude it through a fine spinneret, rather like a garden syringe, into a medium which would cause it to reprecipitate.

Dr. Standring spoke of the pioneer work that had been done in the United States by W. H. Carruthers who, using a diacid and a diene, produced what was now known as nylon. Since then a considerable number of truly synthetic fibres had been produced and brought to the commercial stage, many more had reached the pilot stage, and possibly thousands of others had been made in research laboratories. The three types of synthetic fibres—the polyamides, the polyacids and the polyacrilics—had all been made possible by the work of Carruthers. The discovery of "Terylene" by Winfield and Dixon in 1941, typified this. By the production of polyesters based on an aromatic acid, Winfield had produced a chemical structure that formed a very long chain of molecules and a fibre with a very high melting point.

Referring to the properties and uses of artificial fibres, Dr. Standring said that their study now formed an important part of many degree courses.

AUSTRALIAN NEWS

From a Correspondent

MR. C. N. WATSON-MUNRO, the chief scientist at the Australian Nuclear Research Establishment, said recently that in choosing the types of reactor to be investigated in Australia the programme had been drawn up so that it could be undertaken on a co-operative basis with overseas countries, particularly the United Kingdom, but would not duplicate work being done elsewhere. It had been decided that the two best reactor systems for Australia to undertake research on were a high temperature gas-cooled system using beryllium, and a liquid metal fuel reactor system using a sodium slurry as a coolant. At this juncture it looked as though the gas-cooled reactor offered better advantages for Australia.

Dr. G. C. J. Dalton, the deputy chief scientist, who is supervising research into high temperature gas-cooled reactors, said they were the logical development from the gas-cooled type of reactor being installed for Britain's first nuclear power stations. Small enrichment enabled reactor fuel rods to be made of ceramics instead of metals and so to stand up to more severe working conditions. Further enrichment did away with the need for fuel rods and enabled the uranium to be mixed with the moderator. The systems using beryllium were very much smaller than equivalent graphite systems, and therefore had advantages when small electrical generating units in the range of 5 to 50 MW were required.

The New South Wales Electricity Commission expects to build its next power station at Vales Point, on the southern end of Lake Macquarie. Specifications for the layout and construction of the station are already well in hand. The ultimate capacity is likely to be 1,000 MW, making it the largest power station in Australia. The cost, when completed, will be of the order of £60 million. Tenders have been called for the initial generating plant, which will consist of two 120 or 200 MW units.

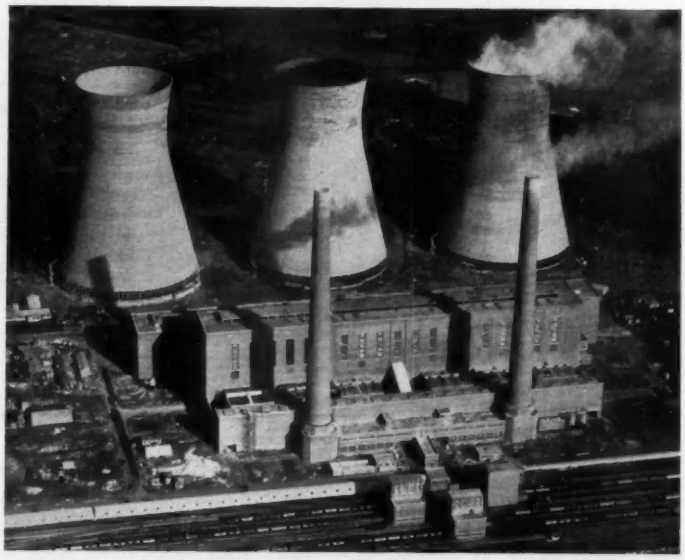
The N.S.W. Cabinet has approved a £250,000 scheme to electrify the metropolitan branch railway line between Clyde and Carlingford. The work will begin almost immediately and is expected to be complete by December, 1959. The line is already electrified to Rosehill, about a mile from Clyde. Mr. Enticknap, the Minister for Transport, said that electrification of the line would save the Railways Department £50,000 a year in operating costs.

Electrical Industries Club

Sir John Hacking, the newly elected president, was in the chair at last Tuesday's luncheon of the Electrical Industries Club when Mr. Paul Reilly, deputy director, Council of Industrial Design, spoke on the importance of industrial design in selling to the European Common Market. He said that we were blessed with more and better trained designers than for a very long time and they should receive the support from industry that they deserved. The vote of thanks to the speaker was proposed by Mr. J. J. Thompson (Berry's Electric, Ltd.). The next luncheon meeting is on Tuesday, 10th June, when Sir John Hacking will be the speaker.

HAMS HALL 'C'

Official Opening by Lord Citrine



ON Friday last Hams Hall "C" generating station was officially opened by Lord Citrine, who was chairman of the former Central Electricity Authority and is now a member of the Electricity Council. This 360 MW station, which was described in detail in our issue of 12th July, 1957, lies about nine miles north-east of the centre of Birmingham. An area of 1,000 acres is occupied by the "A," "B" and "C" stations which have a total generating capacity of 930 MW, the highest capacity of any single site in Europe.

In the "C" station the six 60 MW Fraser & Chalmers-G.E.C. turbo-generators operate with steam conditions at the stop valve of 900 p.s.i. and 900 deg F and they are arranged in line in the turbine house which is flanked on one side by auxiliary switchgear and on the other by combined turbine and boiler operating panels and six Simon-Carves 550,000 lb/hr pulverised fuel fired boilers. Each boiler and turbine is designed for operation on a unit basis without interconnection with other units. Behind each boiler is its mechanical dust collector and electrostatic flue gas cleaning plant. The catenary type coal bunkers are arranged in a bay between the boilers and the operating panels, this position permitting a very simple arrangement of conveyor belts. The station layout is symmetrical about a transverse centre line.

The turbine house is situated on the switchgear side of the administrative block which also accommodates the control room at operating floor level. Workshops and stores are situated behind the precipitators between the two 400ft high brick chimney stacks.

Adjacent to the administrative block and in a line parallel with the main building are three 350ft high, 4,800,000 gal/hr maximum capacity, reinforced concrete cooling towers, which are believed to be the largest of their kind in the world.

Lord Citrine (right) at the opening ceremony at Hams Hall "C" power station, accompanied by (left to right) Mr. R. L. Batley, Mrs. Batley and Sir Christopher Hinton

The total cost of the station was £21 million, one third of which represents the cost of steam raising plant compared with one quarter for civil engineering works. Considerable economies have been effected in the civil engineering design and the total volume of the main buildings represents 41·5 cu ft/kW at a total cost of £4,800,000.

An interesting point about this station is that although designed to burn coal it is at present operating on a mixture of coal and up to a maximum of about ten per cent of slurry which is delivered by road from local coal washeries. Another interesting fact in connection with the station is the erection on an adjacent site by Thermalite, Ltd., a subsidiary of John Laing, Ltd., of a plant which, when completed, will take up to 40,000 tons per annum of dry dust from the precipitator hoppers and use this in the manufacture of building blocks.

At the opening ceremony Mr. R. L. Batley, regional director of the Central Electricity Generating Board, paid a tribute to Lord Citrine, saying that they had started the ten years during which he was their leader short of plant and between that date and now 53 stations had been erected and commissioned.

Mentioning that the series of stations on the Hams Hall site owed its origin to the enterprise of Birmingham Corporation, Lord Citrine said that the "A" station had a thermal efficiency of 22 per cent; the "B" station 26·79 per cent, which was the best in the country in about 1946; and the new "C" station had an efficiency to date of 29·17 per cent. Since vesting date until the end of 1957 improvements in thermal efficiency of generating plant had resulted in a saving to the country of 32 million tons of coal which would have cost £106 million.

After Lord Citrine had declared the station open and unveiled a commemorative plaque, Mr. Batley presented him with an electric fire and Mrs. Batley presented to Lady Citrine a brooch fashioned from pulverised fuel and set in gold.

Speaking on behalf of the guests, Mr. A. L. G. Lindley, joint managing director of the General Electric Co., Ltd., said that the plant at Hams Hall represented the skill and experience of a very large body of men, not forgetting those responsible for the early research.

Cable for Cook Strait

IN 1956 the B.I.C.C. Group was instructed to investigate the practicability of linking the electric power resources of New Zealand's South Island with the supply network of the industrial North Island. This investigation resulted in an announcement on 28th April last by Mr. H. Watt, the Minister in Charge of the New Zealand State Hydro-Electric Department, that the B.I.C.C. Group is to lay, test and recover a trial length of cable in order to provide data for the ultimate installation of a submarine power cable across Cook Strait.

The trial cable, half a mile in length and with an overall diameter of 5in, was manufactured at the Trafford Park Works of British Insulated Callender's (Submarine Cables), Ltd.; it is of the single-core pre-impregnated high-pressure gas-filled type, and is to operate at 250 kV d.c. It has a hollow copper conductor, is paper insulated and lead sheathed, and is suitably reinforced with steel tapes and steel wire armouring to withstand the particular conditions of the sea bed under Cook Strait.

This trial cable was coiled on a drum claimed to be the largest ever produced, being 15ft 8in in diameter and 7ft 6in across, and, with the cable, weighing about 45 tons. It left Trafford Park Works on 24th February, was loaded aboard the s.s. *Carronpark* at Liverpool, and arrived in Wellington, New Zealand, on 16th April.

Under the supervision of engineers from British Insulated Callender's Construction Co., Ltd., the trial length will be laid by the New Zealand Post and Telegraph Department's cable ship H.M.T.S. *Matai* seawards from Oteranga Bay, which is on the North Island shore of Cook Strait south of Cape Terawhiti. After the ends have been sealed, the cable will be anchored and allowed to remain on the sea bed for as long as possible. For the full-length cable the projected Cook Strait crossing route is a distance of some 25 miles, with a maximum depth of 150 fathoms.

The Cook Strait 250 kV d.c. trial cable being loaded at the Trafford Park Works of B.I.C. (Submarine Cables), Ltd.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

B.S.I. Action on Moulded Lampholders

THE technical Press would have little space for other matter if it were used to keep readers informed of progress in the preparation or revision of British Standards. It is for this reason that notification of new work started (including the starting of revisions) and of drafts available for comment, is given regularly in *B.S.I. News*, which is very widely circulated to individuals, companies, and professional and trade organisations. All those interested in any item mentioned in *B.S.I. News* are invited to ask for further information and to apply for copies of the drafts available for comment.

In your issue of 2nd May, "Ignotus" referred to the revision of B.S. 52, "Bayonet Lampholders," and asked why no mention was made in our earlier letter of the draft supplement relating to holders made of moulded material. The reason is that we stated what is being done about B.S. 52, not *how* it is being done. The improvements which the B.S.I. committee desires to see brought about in the design of moulded lampholders include the following: (a) better interchangeability of shade-carrier rings; (b) coarser screw threads on shade-carrier rings; (c) closer control of lamp filament position; and (d) tests to prove the quality of the lampholders.

It is, of course, inevitable that some time must elapse before manufacturers can change their designs to comply with the new standard, and it is expected that the new requirements will be deemed to come into force two years after the date of publication. The details of the proposals are still under discussion by the professional and trade interests represented on the B.S.I. committee, and it will be some months yet before publication can take place.

London, W.1.

J. F. STANLEY,
Divisional Chief Technical Officer.
British Standards Institution.

Electric Heat Treatment

I HAVE read with interest Mr. Oram's comments on my paper in your issue of 2nd May and I am sorry that he should get the impression in any way that we are in competition with manufacturers in development work.

If he will read the paper in detail he will find that we co-operate with manufacturers and, for instance, they make very full use of our industrial showroom, and there is constant interchange of opinions between our representative technical staffs.

The object of my paper was to illustrate the help in electricity development which we can provide for the small and medium-sized factories, and such development work is to the mutual benefit of the electrical manufacturers referred to in Mr. Oram's letter and to the electricity supply industry.

There is no question of us entering the manufacturing field and our work is entirely complementary to that of the manufacturers.

Birmingham, 14.

J. H. PATTERSON,
S.W. Birmingham District Manager,
Midlands Electricity Board.

E.D.A.'s Activities

POINTS FROM THE 1957 REPORT

THE year 1957 was marked by expansion in every department of the British Electrical Development Association's activities, states its Council's report for the year ended 31st December last, and this seems to be reflected in the excellently produced publication, with its handsome coloured cover design. Of particular note was the formation, following the dissolution of the Electric Lamp Manufacturers' Association, of the British Lighting Council on which E.D.A. is represented. The Association staged a record number (32) of electrical displays at exhibitions and shows and in addition the electrical section at the Building Centre had double the number of visitors subsequently making inquiries than in the previous year. Responsibility for the Press publicity for the British Electrical Power Convention was again undertaken by the Association and a paper was read by Mr. Victor W. Dale (the former director).

Press and public relations work continued to expand. Television features included a gardening programme and the staging of a most ambitious and difficult outside broadcast—an evening presentation of night-time scenes of the construction of a Scottish hydro-electric scheme. The Association also took an important part in discussions with other sections of the electrical industry in regard to the advisability of establishing a National Approvals Board for domestic electrical appliances.

During the year three new feature films were produced and the number of copies of films issued on loan reached a total of over 15,000. A revised catalogue of E.D.A. general films was also issued. New photographs added to the photographic library numbered 1,120, and 1,350 photographs were lent to Electricity Boards and other authorities. Domestic advertising during 1957 aimed at increasing the consumption of electricity, especially at off-peak times, and to this end concentration was on electric cookers and water heaters. The advertising media list included 36 national magazines and 62 provincial newspapers and in every advertisement the Electricity Service Centre was prominently featured. As a result of the Association's part in the Ideal Home Exhibition a record total of firm inquiries was passed to Electricity Boards to follow up. The report also gives details of several other E.D.A. displays at a number of exhibitions and agricultural shows.

There was during the year an increasing number of requests for advice from a variety of agricultural organisations, largely stimulated by the Association's advertising programme in the agricultural and horticultural press. Other work of the Rural Electrification Advisory Committee is also reviewed and reference is made to a new scheme which was drawn up for general and detailed farm electrification courses of training for Electricity Boards' staffs.

The Association's work in connection with industrial electrification is dealt with and mention is made of the first Industrial Development Conference organised by the Association which was held at Buxton last October. A large number of requests was received for specialist lectures including the opening paper at the Productivity Conference and Exhibition organised by the Irish Electricity Supply Board in Dublin.

As a direct result of suggestions made by the Association sound and light spectacles made their début at Greenwich and Woburn Abbey. A considerable increase in this type of promotion is expected in 1958. In recognition of the increasing scope for the development of ornamental and other forms of lighting under local authority control the former Street Lighting Committee was renamed the Public Lighting Committee. Among the subjects discussed by the Committee were interference with centralised control of street lighting, earthing of street lighting columns and power factor correction of fluorescent lighting fittings.

The scope of the Trolley-bus and Tramways Committee was widened by the alteration of its title to Electric Traction Committee, and matters dealt with during the year included the circulation of literature on electric traction to selected universities and technical colleges, and the scope for increased use of battery electric vehicles.

A total of 326 appliances and accessories examined by the Testing House during the year represented an increase of 70 over the previous 12 months. Of these, 237 were submitted by manufacturers seeking approval of their appliances by Electricity Boards, or for testing for com-

At the president's reception preceding the E.D.A. annual luncheon: Mr. W. S. Lewis, Mr. J. I. Bernard and Sir Christopher Hinton; Viscount Chandos and Viscountess Kilmuir; and Mr. D. Bellamy, Mr. A. W. Ferguson, Mr. W. N. C. Clinch and Mr. H. J. Randall

pliance with the appropriate British Standards. A further 63 were examined for the B.S.I. in connection with the operation of the "Kite Mark" scheme. Difficulty continues to be encountered in recruiting staff for the Testing House although there has been some improvement. A co-operative testing scheme whereby the four Electricity Boards having testing stations nearest to the Testing House undertook the testing of certain appliances was inaugurated and this enabled a further 50 appliances to be dealt with during the year.

The E.D.A./B.S.I. Advisory Committee dealt with practically the same number of appliances and accessories as were examined the previous year. Only one case was found to be completely free from criticism and in one or two others objection was taken on relatively minor points. The Committee also gave consideration to a number of general matters such as the sticking of shade rings on plastic lampholders; the earthing of portable lighting fittings; and the use of Continental appliance connectors in British appliances.

Education and training activities included the twentieth annual sales conference; the annual conference of electrical housecraft advisers and senior demonstrators; the public speaking competition; salesmanship training courses, etc.

Notes on the work of the Electrical Vehicle Association of Great Britain are contained in the report and mention is made of the marked progress which has taken place in the use and development of battery vehicles. It is stated that a big advance in battery design through the medium of a new battery now in its final stage of development should produce an outstanding advance in battery vehicle traction within the next few years.

The activities of the Electrical Association for Women are dealt with in an appendix. All sections of the E.A.W. showed increased activity in 1957 and thirteen new branches were formed. The E.A.W. took part in some 50 exhibitions and 800 inquiries were received by their Housecraft Department in addition to those dealt with by the Examination and Publicity Departments.

A simplified version of the report has been produced in which the highlights of the Association's work during 1957 are described and illustrated.

Peak Load Problem

At the annual luncheon of the Association which was held at the Connaught Rooms, London, on Tuesday last, the toast "Electrical Development" was proposed by Sir Christopher Hinton, chairman of the Central Electricity Generating Board. He said that the immense and basic difference between the electricity supply industry and other industries in which he had worked was that the electricity supply industry was quite unable to store its product and yet it endeavoured to give its customers a supply at all times. This was done however small and inconvenient the load and with virtually no price differential.

The load factor in this country of around 46 per cent was lower than in most other countries, and the average cost of electricity from the 15 lowest-merit stations was 1s 9d a unit. He apologised for referring again to this skeleton in the industry's cupboard, but stated that there were occasions when the reiteration of the obvious was more important than the elucidation of the obscure. Although a great deal had been done, he regretted that there was still no unanimity of thought about the peak load problem. In his experience once a problem had been adequately considered there might be divergence of thought but there were rarely as many opinions as men in the discussion. He suggested that there was room for research by the E.D.A., the Area Boards and by the manufacturers. The last-mentioned would increase their sales of generating plant if they encouraged the public to buy appliances that operated off-peak. The solution of this peak load problem was of great importance to the future development of the industry.

The response was made by Viscount Chandos, the president of the Association, who also proposed the toast of the guests. He paid a tribute to Sir Christopher Hinton's inestimable services to the country and referred to him as one of the great men of our age. A characteristic of the past year had been the very large export orders placed for generating plant. These, Lord Chandos said, showed that we were strictly competitive, but some foreign manufacturers were undercutting by as much as 20 per cent, which only covered the basic cost of labour and materials. Another feature of British industry was that it tendered for all inquiries, not just the more luscious.

It was not logical, he said, to encourage the use only of those labour saving appliances that were not used in the home, and he expressed the hope that purchase tax on domestic electrical appliances would soon be removed altogether.

Referring to thermonuclear fusion, he expressed the view that this would be harnessed more quickly than scientists would at present like to predict in public, and this would make it necessary to re-think our economic problems. The response was made by Sir Arthur fforde, chairman of the British Broadcasting Corporation.

Annual Meeting

Mr. W. S. Lewis, chairman of the Council, presided at the subsequent annual general meeting at which the accounts were presented by Mr. Ernest Long, chairman of the Finance Committee, and the annual report by Mr. Lewis.

The chairman reported the appointment as president for 1958-59 of Mr. Thomas Johnston, C.H., chairman of the North of Scotland Hydro-Electric Board, and as vice-presidents of Mr. Victor W. Dale, former director and secretary of the Association, and Lt.-Col. E. H. E. Woodward, member of the Central Electricity Authority during its existence from 1948 to 1957.

Mr. D. Bellamy proposed a vote of thanks to Viscount Chandos for his services as president and Mr. A. N. Irens seconded the motion. On the proposition of Mr. W. N. C. Clinch, seconded by Mr. T. M. Ayres, a vote of thanks was accorded to Mr. Lewis. Finally, Mr. D. B. Irving moved a vote of thanks to the chairmen, vice-chairmen and members of the Association's committees and to the technical Press which was seconded by Mr. H. V. Pugh.

At the meeting of the Council which followed, Mr. W. N. C. Clinch, controller, Eastern Division, C.E.G.B., was elected chairman of the Council for 1958-59 and Mr. T. E. Daniels, chairman, North Western Electricity Board, vice-chairman.

Atomic Energy Finance

THE balance sheet of the United Kingdom Atomic Energy Authority as at 31st March last (H.M. Stationery Office, price 6d) shows that the capital account stood at £276,683,897 after adding net advances from the Atomic Energy Office of £70,990,795, assets taken over from Government Departments £10,667 and interest on capital £13,029,444 and deducting the net cost of operations for the year £25,361,407.

VIEWS on the NEWS

By REFLECTOR

WHILE at the Hanover Fair I could not help but feel that the Germans had "got away with it" while we British were left without a "shop window." Regret on this score was expressed last week by Mr. Kenneth Horne in a letter to the *Daily Telegraph*. Mr. Horne was, of course, the managing director of the short-lived British Industries Fair, Ltd., formed to take over the London Sections of the Fair in 1956 with Government support, which was withdrawn after that year. Mr. Horne told me at that time that he hoped that British industry would be prepared to finance a full-scale London International Fair. Unfortunately, his hopes were dashed, although in his *Telegraph* letter he says that he has no doubt that such a fair would have been successful. He thinks that the money being spent by this country at the Brussels Exhibition, which he puts at £3 million, would five years ago "have been a very nice contribution towards permanent exhibition buildings in the London area."

* * *

I have already admitted that, contrary to my original impression, many gas people are no more anxious than electrical men and women to see the "integration" of the two industries, although there are still others who think that salvation lies in that direction. The Eastern Gas Consultative Council has considered what representations should be made on the subject of co-operation to the Ministry of Power and has come to the conclusion (according to the *Eastern Daily Press*) that:—

> "Any proposals for co-operation which might in any way blunt the edge of competition between the gas and electricity industries should be approached with much caution. . . . The Council welcomed the re-statement of Government policy that such competition should be as free as possible."

In spite of this "re-statement," many people still seem to think that the committee studying the subject should make the most of its none-too-clear terms of reference by recommending whole-hog integration.

* * *

Much has been said about the reluctance of the farming community to make reasonable use of the electricity service once an Electricity Board has spent a great deal of money to provide it. Lighting and radio hardly represent a remunerative load, but some farmers are loth to entail the capital expenditure upon plant to make full use of electricity although such expenditure has been proved to be worth their while. If the facts are as stated by the chairman of the South Wales Electricity Consultative Council recently, the farmers in East and Mid-Wales are particularly reticent, for they are asked only to guarantee to use £20 worth of electricity a year in return for free connection. As reported by the *South Wales Evening Post*, the chairman said he thought that in the past the Board had the money but added:—"Now that we have the material, the staff and the money, we haven't the consumers." In consequence in 1957-58 the amount spent on rural electrification was only £218,000 against £250,000 in the preceding year and the number of dwellings connected only 1,071 against 1,300.

* * *

When commenting on the recent Model Railway Exhibition I noted the almost complete absence of models actually steam-operated. This is explained in a letter received from Mr. F. A. Nutter, chairman of the Gauge "1" Model Railway Association and a member of the exhibition committee. It was not so much that electricity was preferred, but because of the necessity of complying with fire regulations—particularly as for steam-driven models methylated spirit is the most convenient form of fuel. Mr. Nutter assures me that there is no lack of steam locomotive models. May they still continue when all our railways are electrified as examples of remarkable skill and ingenuity.

* * *

Floor warming would appear to have a number of possible uses apart from its primary purpose. Mr. S. C. Dinenage, of the Midlands Electricity Board, mentioned a few of these at the recent E.D.A. Sales Conference. One instance was at a garage, the owner of which said that formerly on cold mornings his mechanics warmed up at a coke stove; now they stretched out on the floor under the vehicle and got on with the job. A printer found that his presses could be started promptly, whereas before the installation of floor warming they needed a 30-minute warming-up period. A comptometer operator claimed that floor warming had cured her chilblains.

* * *

A Royal Society *Soirée* was reported in the *Electrical Review* of 15th May, 1878. Eighty years ago electrical devices were still something of a novelty and some of the exhibits at the *soirée* were forerunners of later important developments. For instance, Mr. Robert Sabine "exhibited his discovery of the effect of light on selenium in generating an electro-motive force." Messrs. Siemens Bros. "exhibited one of their dynamo-electric machines capable of giving a light equal to 1,200 normal sperm candles; an electric lamp was also shown by the same firm." Mr. Henry Edmunds demonstrated "his method of showing variations in the pitch of sonorous vibrations by means of a revolving vacuum tube." Among the things shown by the Telephone Company was the "telephone harp" of Mr. F. A. Gower.

> "This invention enables some of the sonorous properties of the telephone to be rendered perfectly audible to a large audience. The telephone being a most unsatisfactory instrument for audible demonstration to a large audience, the harp of Mr. Gower will prove very useful for keeping up the interest of lectures on the subject."

In this photograph of part of the top table at the dinner which followed the conference are (left to right): Mr. A. J. Dalton (deputy chief commercial officer, South Wales Electricity Board); Mr. G. Hayman (A. G. Arnold & Son, Newport, Ltd.); Mr. F. C. Duffield (Midlands Electricity Board); Mr. R. L. Booth (Booth & Bomford, Ltd.); Mr. W. A. Gallon; Mr. C. H. Alger (R. Alger & Sons, Ltd.); and Mr. R. Baden Hellard

Off-Peak Heating Conference

CO-OPERATION BETWEEN CONTRACTORS AND AREA BOARD IN SOUTH WALES

IN South Wales co-operation between the Area Electricity Board and the local branches of the Electrical Contractors' Association is not an empty slogan, something that is referred to on official occasions and then forgotten. It is a practical policy that has been actively pursued for nearly ten years. And a visitor to the area does not have to wait long before he learns from people on both sides of the benefits that are derived from working in "close and friendly relationship."

The Electrical Contractors' Association/South Wales Electricity Board Liaison Committee, from whose aims the quotation is taken, claims to have been the first body of its kind to be formed, and as one of its functions the committee has organised four joint conferences on subjects of common interest. The last of these was held on 6th May at the Seabank Hotel, Porthcawl, and the whole day was devoted to two papers and discussions on the development of off-peak heating. The conference was attended by 110 delegates and there were two guests from the Midlands Electricity Board. On the following day the same papers were presented to an audience of some 70 local architects.

In the morning session, under the chairmanship of Mr. H. Pryce-Jones, deputy chairman of the South Wales Electricity Board, Mr. E. W. Faithfull, A.M.I.E.E., also of the Board, presented a paper entitled "Space Heating by Electrical Thermal Storage." The printed paper had been circulated in advance and, in addition to providing a comprehensive résumé of present theory and practice of electric floor warming and block storage heaters, contained some useful graphs and tables including figures of the yearly consumption of 27 installations. Mr. Faithfull therefore devoted his time to reviewing the most important aspects from the "practical angle of the contractor"; and in the event delegates were no less impressed by the contents of his remarks than by the grasp of his subject which he exhibited by speaking for over an hour without notes.

The Clean Air Act, Mr. Faithfull reminded his audience, came into force on 1st June and where smokeless zones were established there was a prospect of a large turnover to electricity for heating which would be an embarrassment to the Area Boards and C.E.G.B. unless the load was diverted to off-peak hours. An important advantage of floor warming was that it warmed the occupants of a room mainly by low-temperature radiant heat. It ensured warm feet and cool heads, and comfort conditions were provided with a much lower air temperature than was necessary with other forms of heating. In this country we had been "safe and cautious" in adopting a maximum floor surface temperature of 75 deg F. In the United States, however, temperatures of 85 deg F were common, 82 deg F was used in Italy and France and 77 deg F in Germany. Although the concrete base of a building was ideal for floor warming, it might be necessary to increase the loading near windows to compensate for the greater emission of heat. Heating cables could also be run in the wall under windows, and here a surface temperature of 100 deg F was permissible. On the question of control, Mr. Faithfull considered a thermostat working only on the room temperature to be too slow to operate, and he recommended a thermo-control regulator which related the heating period to the outside air temperature.

In existing buildings, where floor heating was not normally practicable, block storage heaters could be used and "the market for these was tremendous." They also provided mainly radiant heat and the reduced air temperature needed for comfort. Another alternative for existing buildings was the use of wood blocks which were grooved on the underside to accommodate a heating cable. Because of the limitation on the cable temperature, Mr. Faithfull considered this system suitable only for background heating. The amount of heat storage was also less than for embedded systems, but this could be an advantage in buildings that had only periodic use. Floor heating for flats had appealed to local housing authorities because of the ease with which supplies could be separately metered, but the electricity authorities would have to give attention to the reaction of the tenant to a large quarterly bill during the heating season.

After lunch the chair was taken by Mr. W. A. Gallon, B.Sc., M.I.E.E., M.Inst.F., chairman of the South Wales

Electricity Board, and delegates had the pleasant, but unfortunately rare, experience of hearing the advantages of electric heating extolled by an architect. In his paper, "The Implications of Electrical Space Heating on the Design and Cost of Buildings," Mr. R. Baden Hellard, Dip.Arch., A.R.I.B.A., A.I.Arb., repeated all the familiar arguments for the use of electricity, but there was no doubt that they gained in force by coming from an independent source. In new buildings, he claimed that electric floor warming was always cheaper in first cost than any other system of central heating and it also gave greater freedom of planning to the architect. Opposition from heating engineers was largely based on prejudice, and arose, Mr. Hellard thought, from the fact that electric floor warming was a complete departure from conventional methods and also involved less professional work.

In a detailed analysis of the capital and running costs of five different methods of heating a detached four-bedroomed house, Mr. Hellard showed the importance of including the appreciable incidental savings that could be obtained by using electric floor warming. Not only could chimneys and fuel stores be dispensed with, but no provision had to be made for their maintenance. The building did not have to be damaged to allow for pipe runs, and the productivity of the builder was increased because the smooth running of the work did not have to be interrupted by a lot of small operations and detailings that were necessary for other heating systems.

So long as the cables were continuously tested during laying, Mr. Hellard thought there was little risk in employing directly embedded systems of floor warming. They had always been specified in buildings by his own firm. He stressed that it was a waste to put an insulating covering on the floor, and he recommended the use of a wood veneer bonded to a quarry tile laid on a "Synthanite" screed. The latter could be laid over large areas without expansion joints. In existing houses with solid floors it might be possible to install floor-warming cables for about £15 more than the cost in a new house, but in other houses block storage heaters would be the answer when they were available. As electric floor heating was a new system, it was important to ensure that architects had adequate and clearly written instructions, since if snags arose the system would be blamed. It was also particularly desirable that the manufacturers of different systems should agree on the presentation of data so that proper comparisons could be made.

In the open forum that followed, the keen interest of the delegates was shown by a steady stream of questions ranging from methods of insulation and double glazing to the proper basis for comparing different heating systems. The admission by several delegates that they used other forms of fuel for heating, led to a spirited discussion on the need for giving special attention to existing buildings which could be converted to electricity, and if the conference reached any conclusion it was that every effort should be made to get block storage heaters made available for domestic use. It was also understood that the South Wales Board would soon be able to make a statement about an off-peak domestic tariff.

HOSPITAL EQUIPMENT EXHIBITION

AN International Hospital Equipment and Medical Services Exhibition, the first of its kind to be open to the public, was held at Olympia, London, from 5th to 10th May. Covering an area of approximately 50,000 sq ft, the exhibition was probably one of the largest and most comprehensive displays of hospital equipment to be assembled under one roof in this country, over 140 exhibitors participating.

The important part played by electricity in the everyday routine of hospital work and management was clearly indicated by the large number of electrical exhibits that were to be seen, many of which were completely new or had only just been developed. Of particular interest was a new Kelvin-Hughes shadowless lighting fitting (Model 36) fitted with a camera attachment which enables colour photographs to be taken to give a "surgeon's-eye" view of an operation. A camera unit which is mounted in the centre of the lamp contains an auto-camera, capacitors for the flash tube, a rectifier for the camera supply (24 V d.c.), a microswitch to discharge the capacitors, a discharge resistor and a relay. A stabilised power unit is provided to charge the flash capacitors to 500 V. As the voltage rises the current increases, the relay operates and "makes" the flash indicating circuit and the camera operating circuit.

A number of items of electro-medical equipment were shown by Siemens Edison Swan, Ltd. Among these was an eight-channel electro-encephalograph fitted with a new type input selector system enabling predetermined arrays of electrode connections to be made by simply plugging in cards. The company also displayed a new transportable 16-channel low-frequency wave analyser for automatic frequency analysis of electro-encephalograms, and a cardiograph instrument with a completely transistorised amplifier, powered entirely by batteries. The "Ensur-a-lite" emergency lighting system was presented and demonstrated how an operating theatre lamp can be maintained under emergency lighting conditions.

The evacuation of operation areas by means of electric suction pumps is now generally accepted as being greatly superior to the methods formerly used, and on the stand

Kelvin-Hughes shadowless lighting fitting with built-in automatic camera unit

of Silten, Ltd., several electrically-operated pumps from the company's "Atmozon" range were shown. These included a new portable model fitted with a totally-enclosed capacitor motor requiring no starting switch safeguards against explosion as the on/off switch is situated in the cable, outside the appliance cabinet. Explosion risk from electric sparking has been reduced to the minimum by fitting mercury type switches to the starting mechanism of all other standard "Atmozon" machines.

As the British representatives of the German made "Osram" products, "V" Development, Ltd., were showing two of the latest "Osram" health ray lamps. One of these, a 300 W "Neron" ultra-vitalux irradiator, comprised in a single glass bowl a mercury high-pressure quartz burner and tungsten filament producing ultra-violet light and infra-red rays. A special radiation cabinet, incorporating these lamps, and designed for the treatment of miners, industrial workers, schoolchildren, etc., was shown for the first time.

There were, of course, many other products to be seen concerned with the purely medical side of hospital work, but apart from these exhibits there were also items for the catering, laundry and general hospital maintenance on view. Electrically-operated floor cleaning machines make an important contribution to hygiene in hospitals and several manufacturers of this type of equipment took the opportunity of displaying their products at the exhibition. Carpet sweepers, vacuum cleaners, floor polishers, etc., were displayed on the Hoover stand, while Truvox, Ltd., showed their new industrial combined polisher and sweeper. Similar equipment was to be seen on the stands of the Progress Organisation, British Vacuum Cleaner & Engineering Co., Ltd., and Tellus Super Vacuum Cleaner, Ltd.

Icemaster (Sales), Ltd., have for some time been specialising in ice-making equipment as applied to hospital use and machines capable of producing from 2,000 to 16,000 cubes per day were displayed on their stand. Of interest to hospital engineers was a display of Lister diesel-electric generating plants.

D.S.I.R. ANNUAL REPORT

New Research Council's First Year of Work

THE report of the Research Council of the Department of Scientific and Industrial Research for the year 1956-57 has just been published as Cmnd. 428 by H.M. Stationery Office, price 4s. This is the first report of the new executive council which was established under the D.S.I.R. Act of 1956. The Research Council has instituted a thorough-going review of the activities of the D.S.I.R. in pure and applied research in the light of present-day conditions. The report shows the main problems before the Council and the way in which they are being tackled.

The report is in a different form from that of previous years and instead of a lengthy account of the activities of the D.S.I.R. stations, a short statement of progress in selected researches is included. This is to be regarded merely as an indication that further information on these subjects is available. Statements from each of the grant-aided Research Associations are omitted altogether; these will be published as a separate document in the near future. The report begins with a review of the great changes in industrial and scientific research since the Department was set up 42 years ago. Then the effects that these changes may have had on the fundamental tasks of the Department are considered and four basic questions are asked.

To answer the question as to what part the D.S.I.R. should play in the conduct of pure research, the Council states that the universities are, and will continue to be, the main centres of pure research although a portion of pure research should be carried out wherever applied research is done on any scale. Care must be taken to ensure that full use is made of the potential research capacity of university staff. The Department has an important part to play here and the Council believes that its expenditure on this activity must rise considerably. In 1956-57 the Council recommended 115 grants for special research projects in science and technology totalling £836,000 in value, compared with 47 valued at £400,000 in the previous year.

In considering what part D.S.I.R. stations should play in research of direct application to industry, the Council is reviewing the scope of the work, but its review will take some time to complete. The Council states that there is a large and growing field of activity in which the Government has a direct interest and a special responsibility and in which, therefore, the research work required is appropriate to the national research developments. To undertake new responsibilities, however, it is necessary to shed some of the existing load.

The action already taken as a result of the review includes the handing over of the responsibility of some sections of the work of the Forest Products Research Laboratories to the Timber Development Association, which receives a grant from the Department. Another step is the proposal that the Agricultural Research Council should take over responsibility for the Low Temperature Research Station, Cambridge, and the Ditton Laboratory, East Malling, from the Food Investigation Organisation. It has also been arranged to close the Fuel Research Station early in 1959 and such of its work as is to be continued will be transferred to the new station at Stevenage, which will have much wider scope and facilities for process development. *Ad hoc* committees have also been set up by the Council to review the work and functions of three other D.S.I.R. stations: the National Physical Laboratory, the Chemical Research Laboratory and the Mechanical Engineering Research Laboratory.

In considering how its resources should be allocated to avoid spreading them over too wide a field, the Council expresses grave doubt of the adequacy of these resources for all that it is charged to do. It points out that in those industries that do not benefit directly from research done primarily for defence purposes the value of production approaches £10,000 million a year. In contrast, the Department is spending less than £10 million for all its activities. Finally, the report considers the extent which industries served by the grant-aided Research Associations can be expected to shoulder the whole financial burden of an adequate research programme either now or in the near future.

Value of Co-operative Research

SPEECHES AT THE E.R.A. ANNUAL LUNCHEON

VISCOUNT HAILSHAM, Lord President of the Council, criticised the size of the electrical industry's contribution to the British Electrical and Allied Industries Research Association when he proposed the toast of the Association at the Savoy Hotel, London, last week. He was speaking at the luncheon following the Association's 37th annual meeting.

Lord Hailsham said he was sure there was no need to sell the value of research to the electrical industry, because from its earliest days the industry had been research-conscious. Though the total now spent on research by the industry—about £10 million—was not unduly large in relation to turnover, the most important feature to stress in looking to a successful future for the Association was a relative absence of consciousness of the value and the need of co-operative research, which the Association existed to supply.

The application and finance of research could best be seen as a partnership in which Government, teaching bodies, research scientists and industry all had important and interrelated roles to play. The Government's policy was to foster co-operative research by contributing a grant to suitably organised research institutions, but as these institutions grew and matured it was surely right for the proportion paid by the industry to rise in relation to the Government's grant. "In our present state of society," he declared, "it is surely neither possible nor desirable for Government to do what is essentially industry's job—and in applied science it is surely industry's job both to ask the right questions and to make the right use of the answers when they come."

In the past the Association had made qualitatively immense contributions. He referred to its work on high voltage switchgear and overhead transmission lines, the dual-purpose heat pump, and to investigations currently being carried out in connection with rural electrification. But was the quantity and volume of the work being done commensurate either with the quality of the work already achieved or with the demands of industry—and the electrical industry in particular? The figures which he had before him rather suggested that the answer to this question was not quite as satisfactory as might be hoped.

Contribution Ratio

One mark of inadequately developed co-operative research was when the industrial contribution bore a disproportionately low ratio to the Government grant. In other great research associations the ratio varied currently between 3 : 1 and 6 : 1. In theirs it was only 2·4 : 1. He could not believe that this was enough, either in relation to the prosperity or the great magnitude of the electrical industry. Breaking this figure down, it was seen that in proportion to a Government contribution of £100,000, the industrial income was only about £240,000, of which more than half came from the supply section of the industry and less than half from the manufacturing section. "When one remembers that according to the British Electrical and Allied Manufacturers' Association's report the value of the electrical goods exported last year was about £280 million and the total turnover about £1,200 million, the contribution to the Association of about £54,000 seems almost pitifully small," he said.

Viscount Hailsham said he sometimes wondered why firms of good standing and otherwise progressive thought often boggled at subscriptions of £100 or £1,000 to which, the income tax laws being what they were, the Chancellor of the Exchequer was an important contributor.

Replying to the toast, Sir Josiah Eccles, the president, added a proviso to what Lord Hailsham had said. He felt they would be encouraged if, while not being asked to increase the proportion of its contribution, the Government "did not run out on us every time we increased our own." He thought they should be content with a fixed contribution from the Government for a considerable period ahead.

Success Indivisible

Most of those present, he said, were industrial executives interested in the welfare of their workpeople, the general standard of living and the success of their firms. Success in these three things was indivisible and anyone who grudged them success in any of these matters did not fully understand the ingredients of national well-being. According to the British way of life, industrial effort in this country was carried on by a large number of individual organisations, and unless the great majority of them were successful commercially there was little hope for full employment or for maintaining our present standard of living. They should all work for the success of both private and public enterprise.

Speaking of the industrial advances since the war, he paid a tribute to the heavy plant manufacturers in the electrical and boiler world for the great assistance which they had given. The co-operation between purchaser and supplier had been an outstanding example of how technical development could make progress. We were in the van of world progress and it was gratifying to see that the advanced standards which had been set in this country were being adopted by the sterling part of the Commonwealth. The achievements of British industry were outstanding and ought to be made more widely known among our political allies. We did ourselves a disservice by not stating it at every opportunity.

He suggested that the small and medium firms, which formed so large a part of British industry, would ensure their survival and make a better contribution to exports if they paid more attention to research. Experience had shown that world trade increased with the degree of industrialisation of the countries concerned. In his judgment assistance to the under-developed countries was not philanthropy but intelligent self-interest.

The toast of the president was proposed by Mr. C. T. Melling, in the absence of the chairman of the Council, Mr. F. H. Bramwell, who was ill.

E.C.A. CONFERENCE

The annual conference of the Electrical Contractors' and Allied Associations is being held at Folkestone from 18th to 20th May. An illustrated report will appear in our next issue

INDUSTRIAL NEWS

Italian Nuclear Power Agreement

In our last issue we reported that an agreement had been signed for collaboration between the Nuclear Power Plant Co., Ltd., and AGIP Nucleare of Italy. The accompanying picture was taken at the Press conference at which the signing of the agreement was announced.

Installation Inspection

The National Inspection Council for Electrical Installation Contracting, 13, Victoria Street, London, S.W.1, has issued the second edition of its "Roll of Approved Electrical Installation Contractors"; the first appeared about a year ago and over 15,000 copies were disposed of. The new Roll contains the names and addresses of more than 5,000 contractors (including Electricity Boards' installation departments) whose workmanship, plant, equipment and tools have been inspected during the past year.

The names are arranged geographically (we note that there are about 40 in the Republic of Ireland) and there are also alphabetical lists of contractors and towns.

Cablemakers and the European Market

The prospects of the British cable industry in relation to the European market are examined by Mr. Leslie Gamage in an article in the May issue of *The Cable*, the house magazine of Pirelli-General Cable Works, Ltd. Although in 1957 exports of cables to the Common Market and Free Trade Area countries accounted for only 3 per cent of total British cable exports and less than one per cent of total production, Mr. Gamage points out that the European market for heavy electrical products is expected to grow apace. If Britain were not linked in some way with the Common Market, not only would our exports be at a disadvantage in the expanding trade of Europe, but pressure from Continental firms would increase on our traditional markets. He concludes that we should not fear the Free Trade Area, only its absence.

Pumps for Canadian Boilers

Extensions to the Richard L. Hearn power station in Toronto will include two forced circulation boilers designed and built by Combustion Engineering-Superheater, Ltd. An order placed with Hayward Tyler & Co., Ltd., calls for six glandless motor pump units, three for each boiler, with a design pressure of 2,900 p.s.i.g. Each unit will be rated at 350 b.h.p. This $157,000 order follows the successful commissioning of a similar unit at the Edison Power Co.'s River Rouge Plant at Detroit. The elimination of circulating pump troubles on high-pressure boilers removes the main obstacle to the continued development of this type of installation which is becoming increasingly popular. International Combustion, Ltd., Derby, is building five forced circulation boilers for the new base load power station at High Marnham. All these boilers will incorporate Hayward Tyler glandless motor pumps, each rated at 240 b.h.p. with a design pressure of 2,650 p.s.i.g. Hayward Tyler are members of the Platt Bros. Group.

Left to right: Signor E. Mattei, Sir Claude Gibb, Signor G. Martinolf and Mr. H. H. Mullens (joint managing director, Nuclear Power Plant Co.), at the Press conference to announce the signing of the agreement between N.P.P.C. and AGIP Nucleare

Nuclear-Powered Ships

Swan, Hunter & Wigham Richardson, Ltd., and the Nuclear Power Plant Co., Ltd., announce that they are entering into collaboration for the design and construction of nuclear-powered ships.

Admiralty Contract

W. H. Allen, Sons & Co., Ltd., Bedford, have been awarded a contract by the Admiralty for the supply of motor-driven main dock and drainage pumping plant for H.M. Dockyard, Rosyth. The plant will comprise two mixed-flow vertical-spindle pumps driven by synchronous induction motors through intermediate shafting, together with associated pipework, switchgear and cabling. The main pump, with 52in diameter branches, will be designed to deliver 66,000 gallons per minute of sea water against a head of 53ft and to operate at heads up to a maximum of 86ft. The drainage pump, with 22/20in branches, will deliver 10,900 gallons per minute against a head of 60ft and operate with a maximum head of 96ft. The main dock pump will be driven by a 1,425 h.p. duct-ventilated synchronous induction motor, operating on an 11 kV, 3-phase, 50 c/s supply, and the drainage pump by a 270 h.p. duct-ventilated synchronous induction motor with an 11 kV/415 V unit transformer. Both the motors and transformer will be manufactured by Bruce Peebles & Co., Ltd., of Edinburgh, who are the main electrical sub-contractors.

Reflector Fluorescent Tubes

The General Electric Co., Ltd., announce that "Osram" reflector fluorescent tubes are now available in the 8ft 125 W size in daylight and warm white types at a list price of £1 2s. Recessed double contact (R.D.C.) caps are fitted as standard. The internal reflector is fully protected and its efficiency is unimpaired by deposits of dust and dirt which tend to collect on the upper surfaces. The addition of this rating extends the range of "Osram" reflector tubes now being marketed to cover 4ft 40 W, 5ft 80 W, and 8ft 125 W ratings.

Lighting Equipment Development Council

The Lighting Equipment Development Council, Ltd., was registered on 6th May as a company limited by guarantee without share capital. The original number of members is 250, each being liable for £5 in the event of winding up. The objects of the Council are to represent the manufacturers of electric lighting equipment on the British Lighting Council and to support and promote the work of that Council, etc. The subscribers are:—Holophane, Ltd.; A.E.I. Lamp & Lighting Co., Ltd.; Falk, Stadelmann

& Co., Ltd.; Revo Electric Co., Ltd.; Benjamin Electric, Ltd.; Crompton Parkinson, Ltd.; Atlas Lighting, Ltd.; and Merchant Adventurers, Ltd. The management is vested in a committee. The solicitors are Bristows Cooke & Carpmael, 1, Copthall Buildings, London, E.C.2.

Chilean Industrialists' Visit

Visits to power installations, factories and transport undertakings have been arranged for four Chilean industrialists who are at present touring the United Kingdom as guests of the Government. The visitors have already been to the Calder Hall station and the Loch Sloy hydro-electric station and are to visit the nuclear power station under construction at Berkeley, nr. Stroud, on Wednesday next. Visits are also being made to manufacturers of electrical equipment, diesel-electric locomotives and public transport vehicles. The following are members of the party:—Sr. Luis Adduard (leader) (general manager, Chilean Development Corporation), Sr. Arturo Aldunate (general manager, Chilean Manufacturers' Association), Sr. Jose Pinera (deputy head, Planning Department, Chilean Development Corporation) and Sr. Raul Saez (general manager, State Electricity Enterprise).

Australian Telephone Order

The Australian Post Office has placed an order with Standard Telephones & Cables, Ltd., for telephone equipment to serve subscribers in rural and sparsely populated areas. The Standard transistorised rural carrier telephone system will be used.

Brussels Exhibition

The Design Research Unit has sent us a number of views of the electrical and allied industries display in the British Industry Pavilion of the Brussels Exhibition, for the design of which the Unit was responsible. From these we select two; one shows the atomic energy section of the display and the other, the lenticular circuit-breaker, the highest unit on the stand; to the left of this is a water-turbine runner.

Materials Handling Films

The National Joint Committee on Materials Handling, a co-ordinating committee for professional and other bodies interested in materials handling, particularly from an educational standpoint, has compiled a list of films on materials handling which is now available upon receipt of a stamped addressed envelope, from the Secretariat, National Joint Committee on Materials Handling, 20-21, Took's Court, Cursitor Street, London, E.C.4. Some sixty titles are listed showing the size and running-time, the source of the film and a brief synopsis of its purpose and audience suitability.

Dimplex Sales Conference

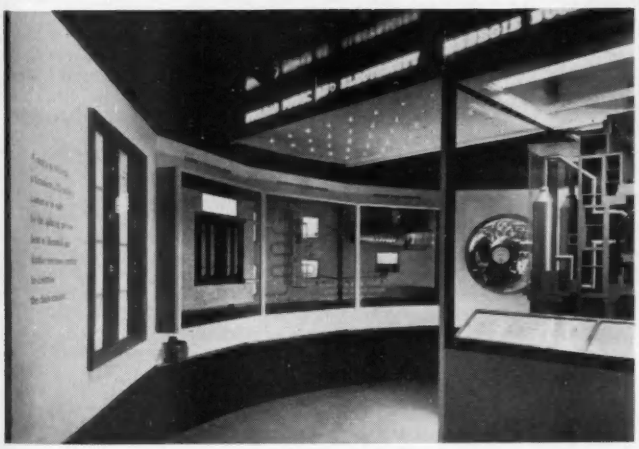
The annual sales conference of Dimplex, Ltd., was held at Millbrook, Southampton, recently. In the course of his address to senior sales executives, Mr. E. J. Wade, managing director, said that the company had undergone major changes in the past three years and the new long-term policy to cater for every purse, pocket and purpose in the heating field had already yielded excellent results. Exports were 40 per cent up on any previous year; their electric radiators, towel rails and skirting board styled convectors had been particularly well received in dollar earning countries. New markets opened up included Uruguay, Japan, Finland, Italy and Portugal. Mr. H. R. Heath, director and secretary, gave a comprehensive review of the company's methods and plans. Mr. D. N. Dale, sales promotion and advertising manager, said that over half a million copies of "The Dimplex Home Warmth Plan" booklet had been distributed. New literature, showcards, displays, stickers would be available in August. Mr. J. D. Rogers (design and development) introduced prototypes of new products. The conference dinner and cabaret was held at the East Close Hotel, Hinton Admiral, in the New Forest.

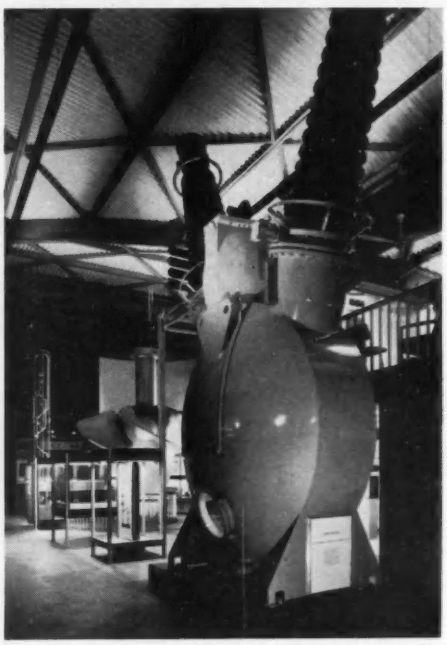
"Britain Lacks Efficiency"

The assertion that "British industry lacks efficiency and salesmanship and will have to pull its socks up in order to meet ever-increasing competition in world markets from Western Germany" was made by Mr. George H. Parker, Assoc.I.E.E., chief electrical engineer, Odhams Press, Manchester, in his chairman's address to the annual conference of the Association of Supervising Electrical Engineers at Hastings last Saturday. The electrical industry, he said, had accepted far too long the position that "it is a real concession for the manufacturers to supply the customer with what he wants." Delivery dates at present on some standard catalogued items were back to what they were in wartime, and recently he had found it quicker to obtain Swiss manufactured goods than to buy British. The insistence that minor but urgent modifications to components, which could be carried out in ten minutes in any average electrical department, must be done at the works with a consequent delay of three weeks was just courting bad trade relations and loss of business.

On the other hand Mr. Parker considered that electrical engineering was

Two views of the electrical and allied industries display at the Brussels Exhibition





one of the "more efficient and progressive" industries that would benefit from the introduction of a Free Trade Area. Competition would be keener but such vast potential markets should serve only to encourage us. Complacency was our current enemy. Whether we became associated with the Free Trade Area or not we should have formidable problems to face. These problems were not made easier by isolation.

Lighting Council Activities

Some notes which we have received from the British Lighting Council (2, Savoy Hill, London, W.C.2) indicate a wide and active range. Among the activities courses of lectures for members' staffs are prominent and many lectures to all kinds of organisations are being given. Publications of the former Lighting Service Bureau are being re-issued with new covers and others are being prepared. Advice is being given to industrialists and others concerned with lighting installations.

It has been agreed, subject to contract, to take up a lease of premises in Brettenham House (very near the Council's present premises). The assistance of an architect is being obtained to ensure the most attractive and useful arrangement of the lighting demonstrations and features in the space available.

Three-Dimensional Miller

A 50 ton electronically controlled machine tool, known as the Fairey/Ferranti three-dimensional high-speed miller, is one of the most advanced machine tools in the world and mills large aircraft components direct from slabs of light alloy. It was designed and built by the Fairey Aviation Co., Ltd., in conjunction with Ferranti, Ltd., Edinburgh, and is operating at the Fairey works at Heaton Chapel, Stockport, Cheshire.

The 3-D miller has a table capacity 8ft high and 28ft long and machines slab material at speeds of up to 150 in/min. It uses the Ferranti method of control by electronic computer. The designer produces a drawing of the part to be machined, each point being given three rectangular co-ordinates, representing distances in the X, Y and Z planes from the common datum. From the drawing a planner prepares the machining programme which is then copy-typed on a Creed tele-typewriter. This produces a paper tape with a series of punched holes representing the programme information in binary code. This paper tape serves as an input to a digital computer which translates the information into a set of pulse-trains on a magnetic tape. The three pulse channels on the tape control the X, Y and Z movements of the machine, each pulse representing a distance of 0·001in.

Fairey/Ferranti 3-D miller

School Floor Warming Installation

In connection with the article bearing the above title in last week's issue (page 895) it should have been mentioned that the total loading of the installation was 410 kW.

Lamp-Making Machinery for Poland

Luxram Electric, Ltd., has been awarded contracts amounting to nearly £120,000 from the Polish Government for fully automatic high-speed lamp-making machines in order to meet the increased demand for electric lamps and to produce new types. Two units for the production of miniature lamps, including photo-flash bulbs, are to be installed shortly, whilst a complete group for fluorescent lamps has also been ordered suitable for an output of 800 lamps per hour.

Technical Authorship

The City and Guilds of London Institute, Gresham College, Basinghall Street, London, E.C.2, has issued a pamphlet giving the regulations and syllabuses for a new scheme of courses and examinations in technical authorship. The scheme of instruction is intended for those with engineering, technical or scientific training and experience, who wish to become technical authors in industry or in Government service. The course of training recommended has been designed with the needs of the younger entrants in mind, but the examinations will also be open to practising technical authors. The intermediate examination will be offered for the first time in 1960, and the final examination in 1961. Specimen examination papers will be prepared and issued in the autumn to technical colleges interested in setting up courses.

An English Electric 345 MVA generator transformer being loaded on board ship at Birkenhead docks. This is the first of two of this rating to be supplied to the Tennessee Valley Authority, U.S.A., and will step up the generator voltage of 22·5 kV to 161 kV for transmission

Coal Conveyor Protection

A trip wire protection system for coal conveyors has been installed at the Poplar gasworks of the North Thames Gas Board by Hugh Wood & Co., Ltd., Royal London House, Finsbury Square, London, E.C.2. The main run of conveyors at this plant are out of view of the switch control room so that it was essential to incorporate a protection system accessible throughout the whole length of the conveyors. The trip wire runs parallel and close to the conveyors and a 6in deflection of the wire in any direction operates the system and shuts down all conveyors. The system can be reset with a key after the cause of the stoppage has been rectified. The trip wire itself carries the current to operate the system. If there is a current failure, short circuit or broken wire the system automatically operates.

Floor Maintenance Methods

As part of a Manchester Regional Hospital Board course on the organisation of domestic work in hospitals, the North Western Electricity Board recently arranged an afternoon session dealing with mechanical methods of floor maintenance in the Central Service Centre, Town Hall Extension, St. Peter's Square, Manchester. Over forty delegates were present, including matrons, assistant matrons and supervisory staff, accompanied by Miss Howat, the adviser to the Ministry of Health on domestic work in hospitals,

and officials from Manchester Regional Hospital Board headquarters. Manufacturers were represented by Mr. J. A. Ward (Truvox, Ltd.), Mr. S. O'Connor (Columbus Dixon, Ltd.) and Mr. A. M. Morgan (Cimex-Fraser Tuson, Ltd.). Talks were given on the treatment of various types of floor surfaces and machines were demonstrated for removing dust, wet scrubbing, drying, waxing, polishing, sanding and scouring. The variety of machines shown included a large industrial type of machine suitable for large areas and a smaller machine capable of treating the floors of the smaller rooms in hospitals.

Leeds Public Lighting Conference

A one-day conference on public lighting was held on 7th May at the British Lighting Council offices in Leeds. The lecturers were Messrs. J. T. Grundy and P. G. Harrison (Siemens Edison Swan), who spoke on "Planning Street Lighting"; Mr. J. W. Howell (British Lighting Council area engineer, Leeds), who lectured on "Lamps"; Mr. L. Jones (G.E.C.), who presented "Street Lighting Lantern Design"; and Mr. H. C. Holdsworth (Yorkshire Electricity Board), whose subject was "Maintenance and Economics." The conference was attended by local members of the British Lighting Council and representatives of street lighting departments of local authorities.

Annual Holidays

The various works of British Insulated Callender's Cables, Ltd., will be closed for the annual holidays during the following periods:—Prescot, Helsby, Melling and Huyton Quarry Works: 25th July to 9th August. Willenhall Foundry: 26th July to 9th August. Erith Works: 19th July to 4th August. Anchor Works, Leigh: 5th-12th July and 6th to 13th September.

Y.E.B. Cookery Demonstration

With a view to encouraging housewives to attend a recent cookery demonstration at Cleethorpes, the Yorkshire Electricity Board arranged for a demonstration of fashion and beauty culture by mannequins from Petchells, of Grimsby. The cookery demonstration was given by Miss Elizabeth Whitham, of the Jackson Electric Stove Co., Ltd., using one of the company's new 396 eye-level grills.

Works Visit

The Prime Minister of Norway, Mr. Einar H. Gerhardsen, accompanied by Madam Gerhardsen, paid a visit to the Rugby Works of the British Thomson-Houston Co., Ltd., on 5th May.

The party included H.M. Ambassador in Oslo, Sir Peter Scarlett, and Lady Scarlett; one of Mr. Gerhardsen's colleagues, Mr. Andreas H. Andersen, and Madam Andersen; and Mr. Knut Thommessen, Counsellor at the Royal Norwegian Embassy in London.

The visitors were met by Mr. E. V. Small, director, B.T.H., and managing director, B.T.H. Export Co.; Mr. H. L. Satchell, director of manufacture, B.T.H.; and Mr. H. E. Cox, general manager, Rugby Works. After being entertained to lunch, the guests were conducted round the works.

Computers for Aircraft Industry

Two more electronic digital computers have just gone into service in the British aircraft industry. A "Pegasus" computer supplied by Ferranti, Ltd., has recently been installed at the Brough factory of Blackburn & General Aircraft, Ltd., and a Ferranti Mark 1* computer has been supplied to Armstrong Siddeley Motors, Ansty.

Furnaces for Railway Modernisation

British Railways, Midland Region, has placed an order with Birlec, Ltd., for two electric arc melting furnaces. They will be installed in the British Railways foundry at Crewe, and will produce 21 tons of high quality steel per day. Each furnace has a nominal capacity of 3½ tons and an electrical rating of 2,000 VA.

Inquiry from Greece

An Athens firm have asked us to put them into touch with British manufacturers of domestic and industrial electrical equipment, including air conditioners and refrigerating equipment, who are not already represented in Greece. We shall be glad to pass on the names of any interested manufacturers.

Design Centre Awards

Presentation of awards to the manufacturers whose products had been chosen as "Designs of the Year, 1958" were made by the Duke of Edinburgh at the Design Centre last week. Included among the twenty items chosen by the judges to receive an award was a 3-light pendant lighting fitting from the "Satina" range manufactured by Hailwood & Ackroyd, Ltd., for the A.E.I. Lamp & Lighting Co., Ltd. The design was by Mr. Nigel Chapman of the A.E.I. design team. The reasons given by the judges for their choice were the quality of its satin finished opal glassware, which is attractive both lit and unlit; the delicacy of the bracket arms; the unostentatious use of brass in combination with black rods; and the general elegance of the range in all sizes. Ease of assembly and accessibility for cleaning and lamp replacement were also carefully considered.

Mr. John Clement (sales director, A.E.I. Lamp & Lighting Co.) receiving a diploma from the Duke of Edinburgh at the Design Centre last week

Next Year's Factory Exhibition

The Factory Equipment Exhibition to be held at Earls Court, London, next year, will be extended from six to ten days and its scope will be widened to include noise reduction methods. It will be held from 7th to 17th April. The thermal insulation exhibition, which was introduced for the first time this year, will next year include exhibits of the latest materials and methods for noise reduction in factories and offices.

Norwegian Furnace Order

Metalectric Furnaces, Ltd., Smethwick, has received an order from A/S National Industri, Oslo, for a continuous electric furnace for stress relieving silicon steel transformer laminations. The furnace will have an output of 850 lb per hour and will be rated at 200 kW. This is the second order for this kind of furnace which Metalectric has received from Norway within the past year.

Mullard Offer to Oxford

Mullard, Ltd., has made an offer to Oxford University of £50,000, payable over a ten-year period, towards the cost of the new college which it is proposed to develop to meet the need for more university places and particularly for more scientists and engineers.

"Where to Buy"

The 1958 edition of "Where to Buy," the electrical trades directory, is now available. This contains in its 185 pages a classified list of the names and addresses, with telephone numbers and telegraphic addresses, of manufacturers of electrical products, electrical wholesalers and contractors. There is also an extensive list of trade names. It is published by "Where to Buy," Ltd., John Adam House, 17-19, John Adam Street, Adelphi, London, W.C.2, at 5s, plus 8d postage.

Trade Announcement

Dynatron Radio, Ltd., has opened a new factory and offices at St. Peter's Road, Furze Platt, Maidenhead, Berks., and the development group, factory, sales office, service department and head office are at that address. The new buildings cover an area of 40,000 sq ft and have been designed to enable an extension of similar proportion to be added in the future.

NEW ELECTRICAL EQUIPMENT

"Drymaster" spin dryer

Plessey drum type magnetic indicator

Metway "Nestaway" 2 pt car kettle

Metrovick mobile infra-red projector unit

Spin Dryer

A new spin dryer, the "Drymaster," has just been placed on the market by DRYMASTER, LTD., 192/196, Kensington Church Street, London, W.8. It has an extra large tub, capable of accommodating over 8 lb (dry weight) of clothes at one time and, it is claimed, the washing load can be damp dried ready for ironing in 4 min. It comprises an outer case of sheet steel finished in cream and red with contrasting satin metallic bands. The perforated inner tub, having an anodised finish, is rustproof and revolves at a speed of 2,200 r.p.m.

For safety in use an automatic switch is incorporated in the lid and the machine can be operated only when the lid is closed. The action of raising the lid switches off the motor. The overall height of the dryer is 24in and it measures 12in in diameter. Rubber feet are fitted to the base to ensure stability in operation and as the weight is only in the region of 20 lb the dryer can be easily transported by the carrying handle. The price is £21 17s 8d plus £4 7s 4d purchase tax in the United Kingdom.

Car Kettle

The new "Nestaway" car kettle just announced by METWAY ELECTRICAL INDUSTRIES, LTD., Metway Works, Brighton, 7, is provided with a 200 W 12 V immersion type element and, it is claimed, will boil a pint of water in 15/20 min.

The body of the kettle is of polished aluminium, with brightly coloured collapsible handle, and the nominal capacity is 2 pt. Each kettle is sold individually boxed, complete with a suitable length of flex, and the price is £1 12s 8d plus 7s 1d purchase tax in the United Kingdom.

Magnetic Indicators

Magnetic drum indicators providing visual warning of the positions of actuators, valves, or other moving components which are remote from control points have recently been introduced by the PLESSEY CO., LTD., Ilford, Essex. Other features of these magnetic indicators are their immunity from the hazard of lamp bulb failure, plus the fact that they dispense with the necessity for return springs or other complicated mechanisms likely to cause breakdowns. Even if an entire circuit should fail, the third or neutral position gives immediate warning. The only moving part is the indicating member itself, which rotates on two robust pivots fitted with pallet or end plates, the action being effected by a novel magnetic arrangement. A variety of colours and display patterns can be arranged to suit the requirements of the user.

All Plessey magnetic indicators are constructed to withstand rigorous conditions of vibration, shock and wide temperature and humidity ranges.

Infra-Red Projector

A mobile infra-red projector unit particularly suitable in paint stoving work is announced by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17. It consists of a standard Metrovick projector with tubular sheathed elements mounted on a robust tripod fitted with rubber-tyred swivelling castors. While other sizes of projector are available, the equipment has been designed for the 24in unit rated at 2 to 2·7 kW at standard single-phase voltages. Local switching is provided by means of a three-heat switch giving control over one, two or three elements. The telescopic tube allows height adjustment from 36in above ground to a maximum of 60in. The projector can also be swivelled through both horizontal and vertical planes to direct the heat to the desired area. The price of the unit, including a standard 24in infra-red projector, is £40.

Electric Furnace Elements

A non-metallic element which makes electrical heating of furnaces up to 1,575 deg C both economic and highly convenient is announced by the MORGAN CRUCIBLE CO., LTD., Battersea Church Road, London, S.W.11. These elements are made of "Crusilite," which is a one-piece, robust, silicon carbide tube produced by a new method which uses a spiral as the hot zone. There are no joints between hot and cold zones, and therefore a common source of failure in other elements of this type is eliminated.

Self-adhesive Nameplates

Self-adhesive nameplates which can be supplied in any shape or size to meet specific requirements are being produced by JOHN GOSHERON & CO., LTD., Albert Embankment, London, S.E.11. These labels and nameplates, an addition to the company's "Tickotab" range of self-adhesive products, are available in a wide variety of materials such as p.v.c., ivorine, brass alloy, aluminium, etc. The plates are claimed to adhere successfully to most metals, wood, glass, plastic and rubber and obviate the need for drilling or pinning. There are no restrictions as

to the style or colours and samples and prices can be obtained upon application to the manufacturers.

Speed Deviation Recorder

Developed as a simplex, duplex or triplex instrument suitable for Post Office rack mounting, the MC/RP21 recorder indicates small deviations from a desired speed in the running speed of rotating machinery. It is manufactured by EVERSHED & VIGNOLES, LTD., Acton Lane Works, Chiswick, London, W.4. The basic speed measuring unit is the Evershed tacho-generator type FF1/20, a permanent magnet machine, which generates a d.c. voltage proportional to the speed of the shaft with a linearity of $\pm\frac{1}{2}$ per cent over a range 0-5,000 r.p.m. This unit is driven by the equipment under test and the voltage generated operates a recorder.

In the recorder the input signal voltage from the generator is compared with a potential established across a precision potentiometer. The potentiometer supply is derived from an internal stabilised source. Decade switches calibrated in r.p.m. may be set up to any speed between 0 and 3,000 r.p.m. in steps of 1 r.p.m. The difference between the signal voltage and the reference voltage from the potential divider is amplified and applied to the recorder movement coil.

Extraction Fan

A 6in diameter type APA propeller fan has recently been added to the range of fans made by KEITH BLACKMAN, LTD., Mill Mead Road, Tottenham, London, N.17. The three-bladed impeller of this fan is manufactured throughout in high impact Styrene p.v.c. material. It is fitted with a domed nose fairing which protects the end of the motor shaft. The larger fans in the APA range, which now extends from 6in up to 48in, are fitted with sheet steel impellers. All fans in the range are driven by totally enclosed motors and are made specifically for fan use. The 6in fan motor is wound for single-phase, 50 c/s, 200/250 V.

Valve Voltmeter

A compact valve voltmeter has been introduced by ADVANCE COMPONENTS, LTD., Roebuck Road, Hainault, Ilford, Essex. Its dimensions are the smallest consistent with serviceability and good instrument design. It incorporates a four-stage amplifier with bridge rectification to the meter. There are twelve ranges covering from 0·001 V to 300 V a.c. and measurements are possible down to 100 μV. The scale is calibrated in r.m.s. volts and dB.

Measurements may be made between 10 c/s and 5 Mc/s and, having a high input impedance (10 MΩ), the instrument is useful for all amplifier measurements and voltage measurements generally. It can also be used as a null detector, indicator or amplifier for frequencies between 10 c/s and 10 Mc/s. Calibration from 15 c/s to 2 Mc/s is ±3 per cent full-scale deflection. From 2 to 4·5 Mc/s the meter reads within ±2 dB.

The instrument can also be used as an amplifier with a gain of 1,000, adjustable in 10 dB steps, up to 10 Mc/s. Suitable for 100-130 V or 200-250 V supply, it is priced at £50.

Oil Circuit-Breakers

A new series of oil circuit-breakers, Type IAA, has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, for the control and protection of small power circuits, and for the direct-to-line starting of s.c. motors up to 60 h.p.

Four standard ratings cover load currents from 21 A to 150 A at 660 V, 50 c/s, but units for current ranges below 21 A and for any voltage up to 660 can be supplied to order. Breaking capacity to B.S. 116 of the three units covering the range 35 A to 150 A is 5·2 MVA, and below 21 A rating is 2·6 MVA to B.S. 936. Provision is made for extending the breaking capacity by back-up h.r.c. fuses.

The circuit-breakers are of fabricated steel construction throughout and pedestal mounts can be supplied. An off-load isolator assembly, with provision for one or two instruments and for the fitting of main h.r.c. fuse links up to 200 A, is arranged to plug into the top of the case. Triple-pole magnetic overcurrent trips are fitted.

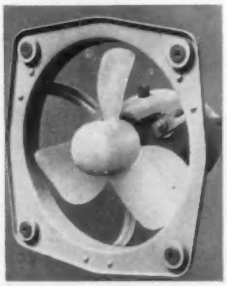
Insulation Tester

A portable insulation tester for production and laboratory testing has recently been introduced by FRASER, SPELLER TRANSFORMERS, LTD., Sydenham Road, Sydenham, London, S.E.26. It is an a.c. flash testing unit of 800 VA output, with testing voltages of 500 to 3,000 V available in 500 V steps. The voltages are selected by a tapping switch connected to the low voltage side of the transformer. An instantaneously operated circuit-breaker is provided which trips when the test piece breaks down. Input voltages from 200 to 250 V in 5 V steps can be accommodated by a voltage selector panel mounted at the back of the instrument.

Primary fuses and yellow and red indicator lamps are accessible from the front panel. High voltage test prods of improved design with retractable points are mounted in spring clips on the side. The case has an attractive silver grey hammered finish, and all metal parts are chromium plated. The price is £44 10s.

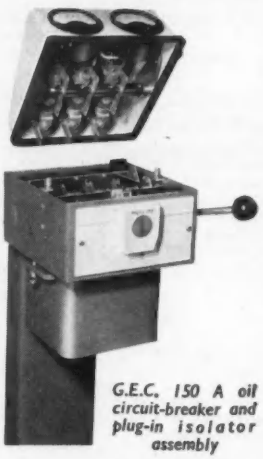
Silent Television

A "silent television" system designed specifically for hospital use has been introduced by HADLEY TELEPHONE & SOUND SYSTEMS, LTD., Smethwick, Birmingham. This four-channel control unit enables the sound part of television programmes to be relayed to individual patients through headphones or pillowphones.

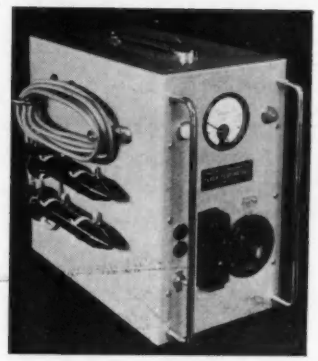


Keith Blackman 6in type APA fan

Advance Type 77 valve voltmeter



G.E.C. 150 A oil circuit-breaker and plug-in isolator assembly



Fraser, Speller Transformers 3 kV portable insulation tester

DOMESTIC ELECTRICAL EQUIPMENT

REFRIGERATORS

LAST year the sales of refrigerators by Area Boards in England and Wales were up by over 50 per cent compared with 1956 and thus more than made good the setback in that year; the actual number of refrigerators sold by the Boards was in excess of 50,000. These Board sales, of course, represent only a part of the total number sold throughout the country, figures for which are not readily obtainable. The indications are, however, that refrigerator sales in general are on the increase and this fact, coupled with the recent welcome Budget announcement of a reduction in the rate of purchase tax from 60 to 30 per cent, should ensure that the growth in the sales figures is at least maintained, if not exceeded during the coming months.

Refrigerators are no longer regarded as a summer-time necessity only and are, in fact, in use all the year round. Many manufacturers have introduced new models since the beginning of this year. Perhaps the most noticeable trend is the greater use that is being made of the inside door areas for storage space. At one time it was only the larger 6 or 8 cu ft "luxury" types that had such refinements; now many of the smaller models incorporate these features of design. The Parnall "Alaska 102," for example, has a capacity of only 2¼ cu ft yet it is provided with bottle and egg racks and butter and cheese dishes in the inside door, as well as automatic interior lighting and a frozen food compartment.

Also worthy of note is the 3·1 cu ft "Packaway," one of three new models introduced by Prestcold. Its dimensions are such that it can be kept under the draining board, built into a kitchen unit or even hung on the kitchen wall. Lec Refrigeration have, since our survey last year, added a 2 cu ft model, the "Coronet," to their range, while the General Electric Co., Ltd., has new 6 and 8 cu ft refrigerators. Five refrigerators, ranging from 3¾ to 14 sq ft of shelf area, constitute the 1958 Electrolux range, and Frigidaire have seven free-standing models ranging in size from 3·2 cu ft to a de-luxe type with a capacity of 11·1 cu ft.

Compared with a year ago the list prices of most makes show a slight increase, but the overall prices are, of course, lower owing to the purchase tax changes.

Manufacturer	Model	Type	External Dimensions (height, width & depth in inches)	Capacity	Shelf Area	Ice Capacity	Salad Crisper	Frozen Food Chest
COLDETTE REFRIGERATION, 11, Dafforne Road, London, S.W.17.	"Coldette"	Absorption	35×21×23	3 cu ft	5·5 sq ft	24 cubes	No	Yes (in ice box)
EASICLENE PORCELAIN ENAMEL (1938), LTD., Lord Street, Wolverhampton, Staffs.	"Easiclene" 4200	Compressor (sealed system)	38×24×25	4·2 cu ft	7·8 sq ft	18 cubes (1 tray)	Yes	Freezer may be used
ELECTROLUX, LTD., 153-5, Regent Street, London, W.1.	M.170	Absorption	31⅞×21×20½	1⅞ cu ft	3½ sq ft	14 cubes (1 tray)	No	No
	L.24	Absorption	36½×21⅝×23⅝	2½ cu ft	5 sq ft	14 cubes (1 tray)	No	Yes
	L.37	Absorption	36½×21⅝×23⅝	3⅜ cu ft	7½ sq ft	14 cubes (1 tray)	Yes	Yes
	L.500	Absorption	53½×26⅜×27½	5 cu ft	9⅜ sq ft	64 cubes (4 trays)	Yes	Yes
	L.76	Absorption	55½×30½×28⅝	7½ cu ft	14½ sq ft	76 cubes (5 trays)	Yes	Yes
ENGLISH ELECTRIC CO., LTD., East Lancashire Road, Liverpool, 10.	7501	Compressor	57⅜×28⅜×25⅝	8·3 cu ft	12·2 sq ft	2 lb	Optional extra	0·58 cu ft U-evaporator
	7502	Compressor	57⅜×28⅜×25⅝	8·4 cu ft	15·3 sq ft	3 lb	Yes (two)	0·8 cu ft full-width evaporator
	7503	Compressor	36×20×22½	3·6 cu ft	6·7 sq ft	1 lb	No	0·3 cu ft U-evaporator
ENGLISH ROSE KITCHENS, LTD., Wharf Street, Warwick.	"English Rose" ER.50	Compressor	36×42×22	4 cu ft	7½ sq ft	1½ lb	No	Yes
	"English Rose" ER.92	Compressor	66×21×22	5½ cu ft	10 sq ft	1½ lb	No	Yes
	"English Rose" ER.93	Compressor	36×21×22	3 cu ft	6 sq ft	1½ lb	No	Yes

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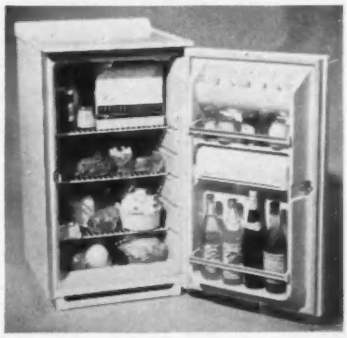
1. *Electrolux model L.24 2¼ cu ft refrigerator*
2. *Easiclene model 4200*
3. *English Electric model 7502 8·4 cu ft refrigerator*
4. *English Electric model 7503 3·6 cu ft refrigerator*
5. *Electrolux model L.37 3¾ cu ft refrigerator*

3



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Interior Light	Special Features	Motor	Element Loading	Finish	Price (excl. tax)	Purchase Tax
No	Oak wooden cabinet	—	150 W	Medium or light oak	£47 0 0 (plus £2 service fee)	£10 4 0
Yes	Moulded Polystyrene door panel with built-in butter conditioner and two large capacity shelves	⅛ h.p.	—	Polystyrene moulded interior, stoved-enamel cabinet, porcelain-enamel " table-top." Various colours	£55 0 0	£12 7 6
No	For building into kitchen fitments. 2 door shelves. Available with right or left hand door	—	140 W	White or cream	£37 4 5	£8 3 4
No	2 door shelves and egg rack. Flexible ice-cube releaser	—	100 W	White or cream	£43 15 9	£9 12 1
No	3 adjustable shelves and cheese and butter compartments in door. Flexible ice-cube releaser	—	125 W	White or cream	£51 16 4	£11 7 4
Yes	2 door shelves, flexible ice-cube releaser, 4 food containers	—	300 W	White or cream	£81 14 9	£17 18 8
Yes	4 adjustable shelves, cheese and butter compartment and egg shelf in door. 2 vegetable drawers, 4 food containers	—	300 W	White or cream	£106 11 0	£23 7 6
Yes	Two door shelves	⅛ h.p.	—	Cream or white, doors in three pastel shades	£89 0 0	£19 10 6
Yes	Full width " Coldrawer," 3 door shelves, butter keeper	⅛ h.p.	—	Cream or white, doors in three pastel shades	£100 12 0	£22 1 5
No	Door storage for 4 full-size bottles, dairy keeper, jar shelf and egg nests, rod shelves	1/12 h.p.	—	Pale cream or white, blue interior	£48 3 3	£10 11 5
No	Designed and styled to match other " English Rose " kitchen furnishings	⅛ h.p.	—	Cream, sea-green or white cabinet. Stainless steel or " Formica " top	£140 10 0	£32 13 4
No	Designed and styled to match other " English Rose " kitchen furnishings	⅛ h.p.	—	Cream, sea-green or white	£87 0 0	£20 4 6
No	Designed and styled to match other " English Rose " kitchen furnishings	⅛ h.p.	—	Cream, sea-green or white cabinet. Stainless steel or " Formica " top	£61 0 0	£14 3 8

Manufacturer	Model	Type	External Dimensions (height, width & depth in inches)	Capacity	Shelf Area	Ice Capacity	Salad Crisper	Frozen Food Chest
FRIGIDAIRE DIVISION OF GENERAL MOTORS, LTD., Stag Lane, Kingsbury, London, N.W.9.	MY-32T	Compressor	35⅝ × 21 × 21	3·2 cu ft	5·3 sq ft	40 "Conettes" per freezing	No	Yes (7 lb)
	MY-32A	Compressor	35⅝ × 21 × 21	3·2 cu ft	5·3 sq ft	40 "Conettes" per freezing	No	Yes (7 lb)
	MY-45T	Compressor	35⅞ × 24 5/16 × 24⅛	4·5 cu ft	8·6 sq ft	18 cubes	No	Yes (10 lb)
	MY-45A	Compressor	35⅞ × 24 5/16 × 24⅛	4·5 cu ft	8·6 sq ft	18 cubes	No	Yes (10 lb)
	DY-45T	Compressor	35⅞ × 24 5/16 × 24⅛	4·5 cu ft	8·6 sq ft	36 cubelets	Yes	Yes (10 lb)
	DY-45A	Compressor	35⅞ × 24 5/16 × 24⅛	4·5 cu ft	8·6 sq ft	36 cubelets	Yes	Yes (10 lb)
	DY-94	Compressor	54⅛ × 27½ × 27⅝	9·4 cu ft	15 sq ft	14 cubes 36 cubelets (2 trays)	Yes	Yes (40 lb) (super-freeze chest)
	MY-94	Compressor	54⅛ × 27½ × 27⅝	9·4 cu ft	16·2 sq ft	14 cubes 36 cubelets (2 trays)	Yes	Yes (19½ lb)
	DY-111	Compressor	62¼ × 27½ × 27⅝	11·1 cu ft	17·8 sq ft	14 cubes 36 cubelets (2 trays)	Yes	Yes (40 lb) (super-freeze chest)
	MY-111	Compressor	62¼ × 27½ × 27⅝	11·1 cu ft	19·8 sq ft	14 cubes 36 cubelets (2 trays)	Yes	Yes (27½ lb)
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	DE.41A	Compressor	36 × 23 × 25⅜	4·2 cu ft	7·7 sq ft	1·4 lb (1 tray)	No	Yes
	DE.61	Compressor	51 × 25½ × 26¼	6·1 cu ft	12·5 sq ft	2·8 lb (2 trays)	Yes	Yes
	DE.81	Compressor	37½ × 21 5/16 × 16⅝	8·1 cu ft	15·7 sq ft	2·8 lb (2 trays)	Yes (two)	Yes
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, W.C.2.	"Hotpoint" C.36	Compressor	36 × 21 × 21	3·6 cu ft	6·9 sq ft	20 cubes (1 tray)	No	Yes
	"Hotpoint" C.50	Compressor	36 × 24½ × 24	5 cu ft	9·9 sq ft	40 cubes (2 trays)	No	Yes
	"Hotpoint" VF.54 (Home freezer)	Compressor	53½ × 27½ × 24½	5·4 cu ft	8 sq ft	Deep freeze	—	—

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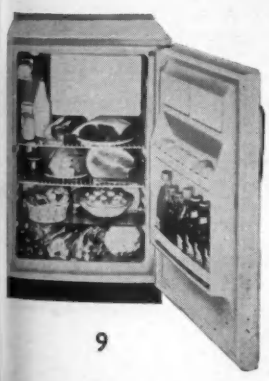
Interior Light	Special Features	Motor	Element Loading	Finish	Price (excl. tax)	Purchase Tax
No	Two door shelves and egg rack, left or right hand door opening, work table top	1/12 h.p.	—	Interior: Acid resistant porcelain-on-steel. Exterior: Plastic based synthetic enamel. Five colours	£47 8 10 (plus £2 service fee)	£10 8 2
No	As above but without work table top	1/12 h.p.	—	As above	£46 11 7 (plus £2 (service fee)	£10 4 5
Yes	Two door shelves, left or right door opening, work table top	1/12 h.p.	—	Finish as MY-32T. Colours: Snowy White or Cotswold Cream only	£56 1 0 (plus £2 service fee)	£12 6 0
Yes	As above but without work table top	1/12 h.p.	—	As above	£54 6 7 (plus £2 service fee)	£11 18 5
Yes	Two door shelves and butter compartment, left or right door opening, work table top	1/12 h.p.	—	Finish as MY-32T Five colours	£62 1 7 (plus £2 service fee)	£13 12 5
Yes	As above but without work table top	1/12 h.p.	—	As above	£60 7 2 (plus £2 service fee)	£13 4 10
Yes	Removable butter and cheese compartments, 3 egg-servers, full-width " Picture-Window " hydrator in door, 2 " Roll-To-You " basket shelves, door lock with 2 keys	⅛ h.p.	—	As above	£115 11 0 (plus £4 service fee)	£25 7 0
Yes	Removable butter and cheese compartments, 2 egg-servers, full-width " Picture-Window " hydrator in door, meat tender, 2 " Roll-To-You " basket shelves, door lock with 2 keys	⅛ h.p.	—	As above	£104 7 1 (plus £4 service fee)	£22 17 11
Yes	Removable butter and cheese compartments, 3 egg-servers, full-width " Picture-Window " hydrator in door, 2 " Roll-To-You " basket shelves, door lock with 2 keys	⅛ h.p.	—	As above	£142 4 10 (plus £4 service fee)	£31 4 2
Yes	Removable butter and cheese compartments, 2 egg-servers, full-width " Picture-Window " hydrator in door, meat tender, 2 " Roll-To-You " basket shelves, door lock with 2 keys	⅛ h.p.	—	As above	£130 3 9 (plus £4 service fee)	£28 11 3
Yes	" Turnaround " top shelf, door racks	⅛ h.p.	—	Gleaming white or honeysuckle	£56 11 9 (plus £2 service fee)	£12 8 3
Yes	2 bottle racks, egg rack, cheese and butter compartments in door panel	⅛ h.p.	—	Gleaming white or honeysuckle, choice of colours for handle insets	£82 8 5 (plus £2 10s service fee)	£18 1 7
Yes	2 bottle racks, 2 egg racks, cheese and butter compartments in door panel	⅛ h.p.	—	Gleaming white or honeysuckle, choice of colours for handle insets	£104 3 0 (plus £3 service fee)	£22 17 0
No	Two ice-blue enamelled shelves, 1 small folding shelf, freezer and chiller dish. Bacon keeper, egg rack and bottle shelf in door	⅓ h.p.	—	White or cream stoved enamel, table top in white, cream, blue, green or red vitreous enamel £2 11 8 extra plus 11s 4d tax	£53 14 11	£11 7 1
Yes	Two ice-blue enamelled (1 adjustable height) and 1 plate-glass shelves and 1 small folding shelf, freezer and chiller dish. Butter and cheese compartment, egg rack and bottle shelf in door	⅓ h.p.	—	White or cream stoved enamel, table top in white, cream, blue, green or red vitreous enamel £2 11 8 extra plus 11s 4d tax	£64 18 10	£13 16 2
No	Audible alarm against rise in temperature and automatic reset	⅛ h.p.	—	White stoved enamel	£130 6 11	£27 3 1



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6. *Frigidaire model MY-94 9·4 cu ft refrigerator*
7. *Frigidaire 4·5 cu ft capacity model MY-45T*
8. *G.E.C. model DE.61 6·1 cu ft refrigerator*
9. *Hotpoint model C.50 5 cu ft refrigerator*
10. *Hotpoint model C.36 3·6 cu ft refrigerator*
11. *G.E.C. model DE.82 8·2 cu ft refrigerator*

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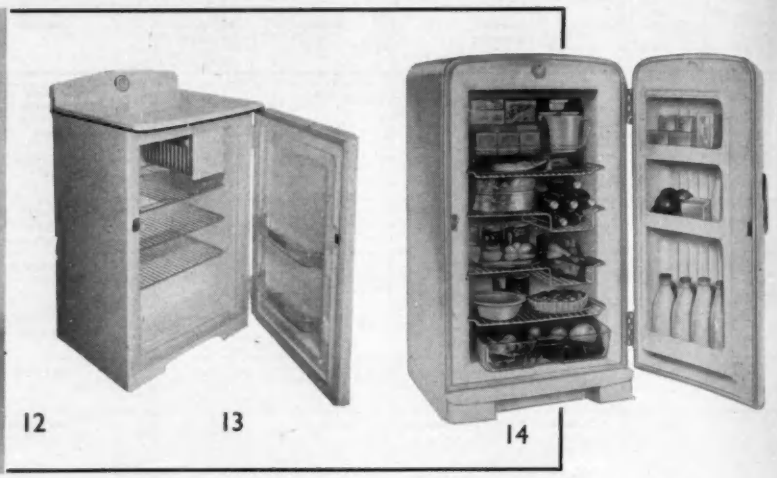

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Manufacturer	Model	Type	External Dimensions (height, width & depth in inches)	Capacity	Shelf Area	Ice Capacity	Salad Crisper	Frozen Food Chest
KELVINATOR, LTD., Great West Road, London, W.4.	" Kelvinator " K46HT or HTC	Compressor	36⅜ × 24⅜ × 24⅜	4·6 cu ft	6⅔ sq ft	1 tray	No	Yes
	" Kelvinator " K47H or HC	Compressor	38 × 22⅜ × 24 15/16	4·7 cu ft	8¼ sq ft	2 trays	Yes	Yes
	" Kelvinator " K65H or HC	Compressor	49 × 22⅜ × 24 15/16	6·5 cu ft	10½ sq ft	2 trays	Yes	Yes
	" Kelvinator " K86H or HC	Compressor	53½ × 24½ × 26½	8·6 cu ft	14 sq ft	3 trays	Yes	Yes
	" Kelvinator " K86HD or HDC	Compressor	53½ × 24½ × 26½	8·6 cu ft	14 sq ft	3 trays	Yes	Yes
Lec REFRIGERATION, LTD., Shripney Works, Bognor Regis.	" Coronet "	Compressor	27½ × 21½ × 20½ (incl. handle)	2 cu ft	3·6 sq ft	12 cubes	No	Yes
	" International "	Compressor	44 × 23½ × 25½ (incl. handle)	6 cu ft	10·7 sq ft	24 cubes	Yes	Yes
	" Continental "	Compressor	57⅜ × 26½ × 27½ (incl. handle)	8 cu ft	14·5 sq ft	24 cubes and multiple cocktail ice portions	Yes	Yes
	HF4 (Home freezer)	Compressor	44 × 23½ × 25½ (incl. handle)	4 cu ft	8 sq ft	—	—	—
	CF25 (Home freezer)	Compressor	41 × 38⅛ × 23½ (incl. handle)	5·4 cu ft	—	—	—	—
LIGHTFOOT REFRIGERATION CO., LTD., Abbeydale Road, North Circular Road, Wembley, Middx.	4.LDR	Compressor	40 × 23 × 25⅝	4·2 cu ft	7·7 sq ft	1·4 lb	No	Held in freezer
	8.LDR8	Compressor	55 11/16 × 27 11/16 × 28 5/16	8·1 cu ft	15·2 sq ft	2·8 lb	Yes (two)	Yes
R. & A. MAIN, LTD., (Electrical Division), 48, Grosvenor Gardens, London, S.W.1.	Main " 36 "	Absorption	46½ × 24½ × 24⅜	3·6 cu ft	7 sq ft	2 lb	Yes	Yes (4 lb)
MORPHY-RICHARDS, LTD., 50, Conduit Street, London, W.1.	" Astral Table " BM/E	Absorption	26 × 20½ × 21½	1·5 cu ft	3·1 sq ft	1·1 lb	No	No
	" Astral Console " BP/A	Absorption	36 × 22 × 21½	2·3 cu ft	5 sq ft	1·1 lb	No	No
	" Astral Commodore " A.400A	Absorption	41½ × 22½ × 24	4 cu ft	8 sq ft	1·6 lb	No	Yes

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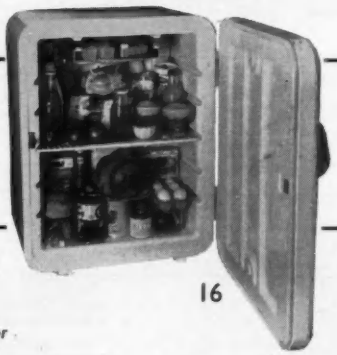

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12. *Kelvinator model K.65H 6·5 cu ft refrigerator*
13. *Lightfoot model 4.LDR 4·2 cu ft refrigerator*
14. *Morphy-Richards "Astral Commodore"*
15. *Morphy-Richards "Astral" 1·5 cu ft refrigerator shown as a wall-mounting model*
16. *Lec Refrigeration "Coronet"*
17. *Main No. "36"*

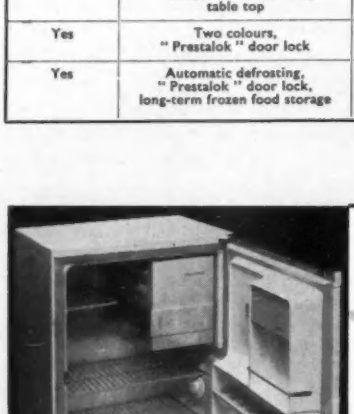
Interior Light	Special Features	Motor	Element Loading	Finish	Price (excl. tax)	Purchase Tax
Yes	Table top. Butter keeper. Egg rack and milk bottle storage in door	⅛ h.p.	—	White or cream stoved enamel	£57 5 8	£12 0 4
Yes	Three-quarter width frozen food chest. Egg rack. Dairy compartment and milk bottle storage in door	⅛ h.p.	—	White or cream stoved enamel	£62 9 0	£13 3 0
Yes	Three-quarter width frozen food chest. 2 egg racks. Dairy compartment and bottle storage in door	⅛ h.p.	—	White or cream stoved enamel	£79 15 3	£16 16 9
Yes	Full-width frozen food chest. Egg racks. Dairy compartment and bottle storage in door	⅛ h.p.	—	White or cream stoved enamel	£97 3 3	£20 8 9
Yes	As K86H but with automatic defrost in both freezer and storage compartment	⅛ h.p.	—	White or cream stoved enamel	£105 15 6	£22 6 6
No	2 adjustable shelves, stand available optional extra	⅓ h.p.	—	White or cream stoved enamel	£30 5 0 (plus £2 service fee)	£6 17 2
Yes	All plastic interior, adjustable shelves, door shelves and butter compartment	⅛ h.p.	—	White or cream stoved enamel	£54 7 6 (plus £2 10s service fee)	£12 6 6
Yes	Three door shelves, butter compartment and "Coolarder"	⅛ h.p.	—	White or cream stoved enamel	£80 0 0 (plus £3 10s service fee)	£18 2 9
—	Adjustable shelves	⅛ h.p.	—	White stoved enamel	£54 5 0 (plus £6 10s service fee)	£11 2 2
—	Automatic alarm and locking handles available as optional extras	⅛ h.p.	—	White stoved enamel	£85 0 0 (plus £4 service fee)	£19 5 5
Yes	Exterior thermostat control knob, door racks, table top	⅛ h.p.	—	White stoved enamel	£52 16 2 (plus £2 service fee)	£11 19 5
Yes	Door racks, divided chiller tray, butter compartment in door	⅛ h.p.	—	White stoved enamel	£96 12 0 (plus £4 10s service fee)	£21 18 0
No	Cooler unit guaranteed for 10 years	—	180 W	White or cream	£52 0 5	£11 15 10
No	Adjustable shelves	—	95 W	White or cream stoved enamel	£30 0 7	£6 14 5
No	Adjustable shelves, 2 door racks	—	95 W	White or cream stoved enamel	£37 15 0	£8 9 0
No	Adjustable shelves, 3 door racks, vegetable drawer and fish or meat container	—	120 W	White or cream stoved enamel	£46 6 8	£10 7 4

Manufacturer	Model	Type	External Dimensions (height, width & depth in inches)	Capacity	Shelf Area	Ice Capacity	Salad Crisper	Frozen Food Chest
PARNALL (YATE), LTD., 255, North Circular Road, Neasden, London, N.W.10.	"Alaska" 101	Absorption	37⅛ × 29⅛ × 21⅝	3·3 cu ft	6·3 sq ft	55 cubes	No	No
	"Alaska" 102	Absorption	31¼ × 20⅛ × 27	2¼ cu ft	4½ sq ft	55 cubes	No	No

Interior Light	Special Features	Motor	Element Loading	Finish	Price (excl. tax)	Purchase Tax
Yes	5 year guarantee	—	105 W	White or cream. White, cream or scarlet vitreous enamel top	£45 12 5	£10 5 4
Yes	5 year guarantee	—	95 W	White. Heatproof plastic table top	£37 10 0	£8 8 9

Manufacturer	Model	Type	External Dimensions (height, width & depth in inches)	Capacity	Shelf Area	Ice Capacity	Salad Crisper	Frozen Food Chest
PRESTCOLD REFRIGERATION DIVISION, PRESSED STEEL CO., LTD., Cowley, Oxford.	"Packaway" D.301	Compressor	33⅛ × 20⅞ × 18¾	3·1 cu ft	5·2 sq ft	3¼ lb	No	Yes
	"Big Four" D.431	Compressor	36 × 22½ × 22 37⅛ × 22¼ × 24½	4·3 cu ft	7·8 sq ft	4½ lb	No	Yes
	"Superb Six" D.601	Compressor	47 7/16 × 25⅛ × 25 5/16	6·4 cu ft	10 sq ft	9 lb	Yes	Yes
	"Automatic Nine" T.901	Compressor	56 5/16 × 27⅛ × 27	9 cu ft	12½ sq ft	11¼ lb	Yes	Yes

Interior Light	Special Features	Motor	Element Loading	Finish	Price (excl. tax)	Purchase Tax
No	Can be wall mounted or fitted with kitchen units	1/11 h.p.	—	White or cream synthetic enamel	£49 8 10	£10 8 2
Yes	Many colour combinations, "Prestalok" door lock, table top	1/10 h.p.	—	White or cream synthetic enamel	£56 6 7	£11 18 5
Yes	Two colours, "Prestalok" door lock	1/8 h.p.	—	White or cream synthetic enamel	£83 4 1	£17 11 11
Yes	Automatic defrosting, "Prestalok" door lock, long-term frozen food storage	1/6 h.p.	—	White or cream synthetic enamel	£119 11 0	£25 7 0



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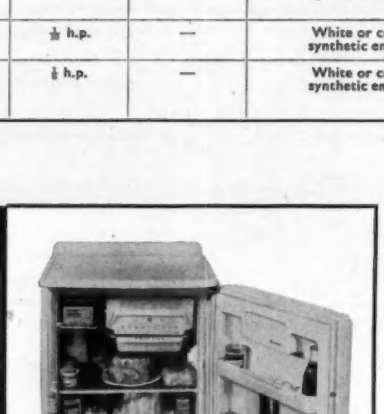

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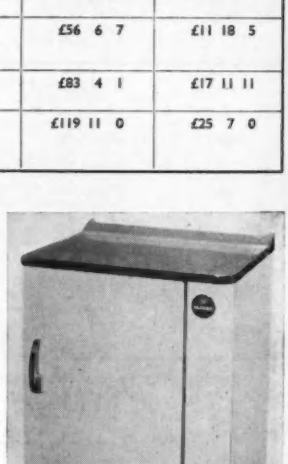

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18. *Prestcold "Packaway" 3·1 cu ft refrigerator*
19. *Prestcold "Big Four" 4·3 cu ft refrigerator*
20. *Parnall "Alaska 102"*

GENERATION AND DEVELOPMENT

Boards' Sales of Domestic Appliances

The accompanying table shows the number of new appliances sold by Area Electricity Boards in England and Wales for the year and the quarter ended 31st March last, together with

	Quarter ended 31st March, 1958		Twelve months ended 31st March, 1958	
	Total	% change	Total	% change
Cookers ...	52,335	− 2·3	228,802	+ 6·5
Water Heaters				
Immersion ...	24,831	+ 7·4	142,184	+ 4·6
Storage ...	10,672	+ 4·4	42,104	+ 1·2
Wash Boilers ...	19,620	− 4·5	79,591	+15·0
Washing Machines ...	16,340	−10·1	71,711	+ 3·4
Refrigerators ...	4,973	− 1·3	49,962	+49·6

percentage changes compared with corresponding periods of the previous year. Sales by Area Boards, of course, represent only a part of the total number of appliances sold throughout the country.

Renaming of South Wales Sub-Areas

To make it easier to identify the areas they serve, the South Wales Electricity Board has decided to rename its four Sub-Areas, without altering their boundaries in any way. The new names with details of the respective managers and offices are as follows:—

West Wales Area (formerly known as the Western Sub-Area): Manager, Mr. W. E. Richardson, A.M.I.E.E. Area office, Tenby.

Swansea and West Central Area (formerly known as the West Central Sub-Area): Manager, Mr. G. R. T. Edwards, B.Sc., M.I.E.E., M.Am.I.E.E. Area office, Fforestfach, Swansea.

Cardiff and East Central Area (formerly known as the Central Sub-Area): Manager, Mr. C. L. Townsend, Associate I.E.E. Area office, Cardiff.

Monmouthshire and Mid-Wales Area (formerly known as the Eastern Sub-Area): Manager, Mr. D. G. Gwyn, B.Sc., A.M.I.E.E. Area office, Newport.

Thorpe Marsh Precipitator

The electro-precipitation plant for the first boiler unit at the new Thorpe Marsh power station (Yorkshire Division, Central Electricity Generating Board) is to be designed and constructed by Simon-Carves, Ltd. This boiler unit will have an output of 550 MW and the precipitator gas volume will be 1,540,000 cu ft/min, which is believed to be the heaviest duty yet proposed for precipitators on a single boiler unit anywhere in the world.

The boiler, which will be supplied by International Combustion, Ltd., will consume about 210 tons of pulverised fuel per hour. The flue gases will be cleaned by an installation consisting of pre-collectors for the removal of the coarser dust followed by electro-precipitators for the collection of the remaining fine dust particles. The combined guaranteed efficiency will be 99·3 per cent. Under average conditions dust will be removed by the precipitator at the rate of about 12 tons an hour and the stack emission will be considerably less than 0·1 grain/cu ft. The cost of the complete dust cleaning plant for this unit will be about £500,000.

East Glasgow Reinforcement

A scheme for the reinforcement of the primary distribution network in part of eastern Glasgow at an estimated cost of £384,000 has been approved by the South of Scotland Electricity Board. The scheme provides for the establishment of a 33 kV distribution network to be fed from Carntyne grid substation, which will supply Rigby Street substation and two new substations to be constructed in Eckford Street and Eastercraigs. The area is at present supplied from Dalmarnock generating station. Work will commence during 1959 and will continue until 1961.

Generating Plant Extensions

New plant commissioned by the Central Electricity Generating Board last month included the following:—Tilbury: 60 MW English Electric turbo-alternator and 60 MW-equivalent John Thompson boiler. Poole: 60 MW G.E.C. set.

Batteries for Underground Power Station

Storage battery equipment has been supplied by the Pritchett & Gold and E.P.S. Co., Ltd., to the North of Scotland Hydro-Electric Board for Glenmoriston, the first large underground power station in Great Britain. The 110 V equipment consists of a 400 Ah battery of 55 cells of the NB.17 open-top type for control of the two 16 MW turbo-generators, the operation of switchgear, the closing and opening of a number of gates, and for the d.c. emergency lighting system. A 50 V 40 Ah battery, consisting of 24 cells of the CTX.9 closed-top type, is accommodated in a sheet steel cubicle and provides a supply for general indications and for operating local and remote alarms. The unit is provided with charging equipment.

Water Power in Denbigh

As a means of attracting light industries to the area, Ceiriog (Denbigh) Rural District Council recently put forward the suggestion that the River Ceiriog might be used as a source of hydro-electric power. The Central Electricity Generating Board, however, has stated that, while feasible, such a scheme would be costly in comparison with alternative fuel sources and cannot be considered at present.

Payments to Landowners

The South of Scotland Electricity Board has reached agreement with the National Farmers' Union of Scotland and the Scottish Landowners' Federation on a new basis of payments for electricity lines carried over agricultural land and woodlands, it was announced on 23rd April. The new rates, which the N.F.U. president described as a great improvement on the Board's current scale of payments, are operative as from 15th May.

OVERSEAS

Rural Progress in Quebec

Ninety-five per cent of Quebec's farms are electrified, Premier Duplessis announced recently. He said that electricity co-operatives financed by the Government had built 19,969 miles of lines in rural Quebec which served 133,126 farm families. Rural electrification helped to stem the trend of farmers' sons moving to the cities by making life in farming areas more attractive.

Supply in Melbourne

The report of Mr. G. H. C. Nicholls, city electrical engineer and manager, Melbourne, for the year ended 30th September last records further progress in the installation of storage space heaters. With the 2,046 sold during the year the connected load of such heaters was increased by 2,280 to 9,750 kW. This has helped to improve the system load factor which, however, is still only 36·3 per cent. Sales of electricity last year totalled 314 million kWh, 2·2 per cent more than in 1955-56.

Swedish Power Plant Capacity

Hydro-electric plant capacity in Sweden at the end of last year aggregated 5,500 MW, an increase of 342 MW, according to a report presented at the annual meeting of the Swedish Water Power Association. This year it is expected that 622 MW will be added, by far the largest annual increment to date. Thermal plant capacity, which increased by 140 MW to over 1,400 MW in 1957, is likely to rise by about 130 MW this year.

Water power stations now under construction will add some 2,000 MW and thermal stations a further 400 MW to the present capacity.

Financial Section

STOCKS and SHARES

FOR a further week the developments in the labour disputes have of course been a main factor in determining the course of Stock Exchange prices. Markets stood up well to adverse news from that source, and showed readiness to respond to encouragement. In the industrial market, general attention was paid to Mr. Lionel Fraser's review of affairs at the Babcock & Wilcox meeting, especially his references to the failure of persistent and successful efforts in expanding turnover to make any significant change in the level of profits. Among the reasons for this increasingly common experience in industry, he gave the rising cost of labour and materials, intense competition and finer profit margins. He saw little sign of an early reversal of that tendency, but stressed the long-term character of many of the projects on which the group is engaged.

New A.E.I. Shares

Dealings are now taking place in the new Associated Electrical Industries £1 shares, of which 1,155,555 were issued to Elliott-Automation as consideration for A.E.I.'s purchase of the share capital of Associated Insulation Products. These shares are understood to have been sold by Elliott-Automation, and they have come to the market in the form of renouncable allotment letters, which are transferable, for the time being, free of the usual 2 per cent stamp duty: for that reason the price, at about 49s, is a little above that of the old shares, although the new will not participate in the first quarterly dividend for the current year due to be declared shortly. For last year A.E.I. paid three interims, each of 2½ per cent, and a final of 7½ per cent. On the total distribution of 15 per cent the shares offer a yield of a fraction over 6 per cent.

Price Changes

Although a number of electrical shares had lost some ground by the beginning of this week, changes were seldom of much consequence and good features were by no means lacking. In the cable group, where most of the dividends and results for 1957 have now been published, movements were mixed, with Aberdare and Hackbridge Holdings better, and B.I.C.C. and Henley's on the easy side. Elsewhere, S. Smith were marked up sharply to 8s 6d after the company's declaration of an increase in the interim dividend, and Anglo-Portuguese Telephone moved up 1s further under the influence of the annual results. Increases in Heatrae's profits and dividend induced a rise from 4s 3d to 5s 6d in the 2s shares, and Parnall (Yate) jumped again, from 8s 9d to 12s, in anticipation of further news about an amalgamation with Radiation, Ltd. A rise of 2s 3d in Mather & Platt followed the report of a scrip issue proposal. Ever Ready's final dividend is expected next Tuesday (20th).

J. & P. Dividend

Announcement of the financial results of Johnson & Phillips for last year

Price Changes in

Company or Board	Nom. Value	Middle price 12th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1958 Highest	1958 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	74½	−1	3	3	4 0 6	75½	72
Brit. Elec. 1974/77	100	71½	−1	3	3	4 4 0	72½	68½
Brit. Elec. 1976/79	100	75½	−½	3½	3½	4 13 3	76	72
Brit. Elec. 1974/79	100	85	−1	4½	4½	5 0 0	86	82½
Overseas Electric Supply								
Calcutta Elec.	£1	16/-		6†	6·8†	8 10 6†	16/9	15/-
East African Power	£1	19/-	+6d	7	7½	7 18 0	19/3	17/6
Nigerian Elec.	£1	15/-		10	10	13 6 9	17/-	14/9
Perak Hydro-Elec.	£1	14/-	−6d	10	12½	17 17 3	15/6	14/-
Electrical Shares								
Aberdare Holdings	5/-	11/-	+3d	17½	17½	7 19 0	11/6	9/9
Aerialite	1/-	6/3	−3d	48	51½	8 4 9	6/9	5/1
Allen, W. H.	£1	34/6		10	10	5 16 0	35/-	32/9
Anglo-Portuguese Tel.	£1	25/9	+1/-	8	9	6 19 9	25/9	19/9
Aron Elec. Ord.	£1	53/9		15	15	5 11 6	54/6	53/-
Assoc. Elec. Ord.	£1	48/9	−1/3	15	15	6 3 0	51/3	46/6
Automatic Tel. & El.	£1	60/9	−2/3	17	17	5 11 9	66/3	57/-
Babcock & Wilcox	£1	48/9		15	13‡	5 6 6	52/9	41/9
Bakelite	10/-	19/-		15	15	7 18 0	21/-	17/6
Baldwin, H. J.	2/-	2/9		20	20	14 10 9	3/9	2/9
Berry's Electric	5/-	7/-	−6d	—	10	7 2 9	7/6	5/9
British Aluminium	£1	38/-	−9d	12	12	6 6 3	47/-	38/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	22/6	−6d	22½	25	5 11 0	24/-	19/6
B.I. Callender's	£1	43/-	−1/-	12½	12½	5 16 3	44/6	38/9
B.I. Callender's 6% Pref.	£1	19/6	−6d	6	6	6 3 0	20/3	19/6
British Tabulating	£1	45/-	−9d	9	10	4 9 0	45/9	38/6
British Thermostat	5/-	25/-		25	25	5 0 0	25/-	19/9
British Vac. Cleaner	5/-	4/9		10	10	10 10 6	5/3	4/6
Brook Motors	10/-	37/6		25	25	6 13 3	37/6	33/3
Bulgin, A. F.	1/-	5/-		40	45	9 0 0	5/6	4/7
Bulpitts	5/-	7/6		—	12½‡	8 6 9	7/6	7/6
Burco Dean	5/-	9/6		20	22½	7 18 0*	9/6	7/9
Cable & Wireless: Ord.	5/-	10/-		10	10‡*	5 0 0	10/-	8/-
4% Loan	100	94		4	4	4 5 0	94½	89
Chloride El. Storage "A"	£1	58/9	−1/3	17½	17½	5 19 3	62/-	55/6
Clarke Chapman	£1	112/6	−7/6	27½	27½	4 17 9	7½	5½
Cole, E. K.	5/-	17/6	−3d	17½	17½	5 0 0	18/-	15/6
Cossor, A. C.	5/-	4/9		Nil	2½	2 12 9	5/6	4/4
Crabtree	10/-	26/-	−3d	20	20	7 13 9	26/3	24/4
Crompton Parkinson Ord.	5/-	9/-	−6d	16	16	5 18 6*	10/3	8/3
De La Rue	10/-	23/3	−1/-	30	35	7 10 6*	25/3	20/9
Decca "A"	4/-	24/6	−1/-	43½	43½	7 2 9	27/6	21/3
Desoutter	5/-	14/6		32½	18½*	6 9 3	14/6	13/6
Dewhurst	2/-	7/-		16½	20	5 14 3	7/9	6/9
Dictograph Tel.	2/-	5/9	−3d	20	20*	6 19 3	6/-	4/7
Dubilier Condenser	1/-	3/6		30	30	5 14 3*	3/9	3/1
Duport	5/-	8/6		25	25	7 16 3*	9/4	8/-
E.M.I.	10/-	33/6	+1/6	15	15	4 9 6	34/6	27/6
Electrical Components	5/-	7/6		25	12½*	8 6 9	8/-	7/-
Elec. Construction	£1	21/3		8½	8½	8 0 0	22/9	21/-
Elliott-Automation	5/-	13/3		—	10‡	3 15 6	13/9	11/6
Enfield Cable Ord.	£1	14/-		Nil	2½	3 11 6	14/-	10/9
English Electric	£1	53/9	−1/3	14	14	5 4 0	56/3	44/-
English Electric 3½% Pref.	£1	12/3		3½	3½	6 2 6	12/3	11/9
Ericsson Tel.	5/-	20/-	−1/-	22†	12*†	3 0 0†	21/-	17/6
Ever Ready	5/-	15/6	−6d	35	37½	6 1 0*	16/-	13/9
Falk Stadelmann	£1	38/9		17½	17½	9 0 9	38/9	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

came at a time when the shares were already attracting a good deal of interest through the earlier statement on the subject of a possible link-up with W. T. Henley's Telegraph Works Co., which had the effect last month of raising the price of the shares from 15s 6d to well over 20s. They were quoted at about that figure after the declaration of a 5 per cent dividend, which on this occasion is the total for the year, the interim having been passed because of the uncertainties of the trading position. For 1956 a total of 10 per cent was paid, partly out of reserves. Group profits for 1957, after tax and all charges, have improved from £34,000 to £91,000 and cover twice over the dividend of 5 per cent.

Electrical Investments

Company or Board	Nom. Value	Middle price 12th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	31/3	−1/3	14	12½	—	38/9	29/3
G.E.C. 6½% Pref.	£1	20/6	−3d	6½	6½	6 6 9	21/3	20/3
General Cables	5/-	11/9		30	24	10 4 3	11/9	11/-
Greenwood & Batley	£1	47/6		17½	17½	7 7 3	48/-	45/-
Hackbridge Holdings	5/-	12/9	+1/6	30	20	7 16 9	12/9	7/6
Hackbridge & Hewittic	5/-	12/-		23	20	8 6 9	12/-	9/7
Head Wrightson	5/-	17/9		20	22½	—	19/-	16/9
Heatrae	2/-	5/6	+1/3	15	20	7 5 6	5/6	4/-
Henley's	10/-	12/-	−1/-	11½	11½	9 11 9	14/6	10/6
Holophane	5/-	13/6		30	37½	8 6 9*	13/9	12/6
Hoover	5/-	39/-	−1/6	50	50	6 8 3	40/6	31/-
I.C.I.	£1	43/9		10	12	5 9 6	45/-	35/6
Intl. Combustion	5/-	23/6		22½	25	5 6 6	24/6	19/3
Johnson & Phillips	£1	20/-	−9d	10	5	5 0 0	25/-	15/-
Lancashire Dynamo	£1	36/3		11	11	6 1 3	37/6	28/6
Laurence, Scott	5/-	14/9		15	15	5 1 9	14/9	12/6
Lister, R. A.	£1	24/3	−6d	10	10	8 5 0	26/3	23/-
London Elec. W're	£1	42/-	−6d	12½	12½	5 19 0	43/9	39/6
Lucas, J.	£1	33/-		7½	7½	4 11 0	33/3	27/9
Marconi Marine	£1	32/-		10	10	6 5 0	32/-	29/-
Marryat & Scott	2/-	12/-		30	35	5 16 9	12/-	10/3
Mather & Platt	£1	56/6	+2/3	15	15	5 6 3	56/6	43/9
Metal Industries	£1	29/-	−1/-	Nil	9	6 4 3	30/-	22/9
Midland Elec. Mfg.	£1	45/-		12½	12½	5 11 0	48/3	44/-
Morphy-Richards	4/-	16/9		50	20*	4 15 6	16/9	14/6
Murex	£1	54/3	+6d	20	20	7 7 6	57/6	53/3
Newman Ind.	2/-	2/3		10	10	8 17 9	2/9	2/3
Oldham & Son	1/-	2/6		17½	17½	7 0 0	2/7	2/3
Parnall (Yate)	5/-	12/-	+3/3	12	12	5 0 0	12/-	5/9
Parsons, C. A.	£1	45/-		8½	7½*	3 6 9	53/6	43/-
Plessey	10/-	56/9	−1/3	30	30	5 5 9	59/-	55/-
Pye "A" Deferred	5/-	13/-		12½	12½	4 16 3	13/9	10/-
Reyrolle	£1	78/9	−9d	17½	17½	4 9 0	84/6	73/6
Rheostatic	4/-	6/3		12½	12½	8 0 0	8/-	6/3
Richardsons Westgarth	10/-	14/6		16⅝	16⅝	5 15 0*	15/-	13/-
Scottish Cables	4/-	13/-	−3d	27½	27½	8 9 0	13/9	12/3
Simon-Carves	5/-	26/9	−9d	20	25	4 13 6	27/9	22/6
Smith (England), S.	4/-	8/6	+9d	17½	20	4 14 3*	8/6	7/-
Southern Areas	£1	13/9	+1/3	7½	7½	10 18 3	13/9	9/6
Strand Elec.	5/-	5/-	−3d	15	15	15 0 0	6/3	4/9
Sturtevant	5/-	15/3	−3d	15†	15†	4 18 3†	18/-	15/3
Sun Elec.	£1	47/6		25	25	10 10 6	47/6	47/3
Switchgear & Cowans	5/-	11/-		25	22½	10 4 6	11/9	8/9
Taylor Tunnicliff	5/-	12/9	−6d	15	17½	6 17 3	13/9	11/9
T.C.C.	10/-	35/-	−1/3	25	25	7 2 9	38/6	35/-
T.C. & M.	£1	24/6		8½	8½‡	6 18 9	27/-	20/-
Telephone Mfg.	5/-	4/9		10	10	10 10 6	5/2	4/6
Telephone Rentals	5/-	11/-	+6d	12½	12½	5 13 9	11/-	9/9
Thompson (John)	5/-	24/6	−6d	25	25	5 2 0	27/-	23/-
Thorn Elec.	5/-	21/3		15	17½	4 2 3	21/6	19/9
Thornycroft	£1	25/9		12½	12½	9 14 3	27/9	21/-
Tube Investments	£1	51/9		13⅓	15	5 16 0	54/6	48/3
Vactric	5/-	14/6		17½	25	8 12 6	15/6	14/3
Veritys	5/-	5/3		12½	12½	11 18 3	6/9	5/3
Walsall Conduits	4/-	12/-		20	20	6 13 3	12/-	11/-
Ward & Goldstone	5/-	25/6		35	40	3 18 6*	26/-	23/6
Watford	2/-	6/9	−3d	25	25	7 8 3	7/-	5/-
Westinghouse	£1	37/6		18	10*	5 6 9	38/9	32/3
West, Allen	5/-	10/6		15	12½*	5 19 0	10/9	9/3
Wolf Electric	5/-	6/9		20	10*	7 8 3	9/-	6/9

Telephone Prospects

At the annual meeting of the Automatic Telephone & Electric Company, Sir Thomas Eades had under review another year of successful progress: group profits expanded by more than 20 per cent, and the ordinary distribution was repeated at 17 per cent. He reported that this year started with a full order book, but as a result of the cutting back of Post Office expenditure, in accordance with Government policy for the nationalised industries, the manufacturing programme was not as expansive as had been anticipated earlier. He also mentioned evidence of a slackening of large orders for 1959–60 delivery, but thought it too early in the year to make forecasts, and emphasised that deferment of telephone expansion meant business delayed, rather than lost. The price of the £1 shares eased to 60s 9d.

Bowthorpe Holdings

There was a good response from Bowthorpe Holdings 2s ordinary shares to the company's announcement of the 1957 results, the price being advanced from under 8s to about 8s 6d. Both the final dividend of 18 per cent and the expansion of earnings from £578,000 to £767,000 were up to best market expectations. Dividends for the year total 25 per cent, payable on capital doubled by a scrip issue, and representing in effect an increase of 6¼ per cent on the previous rate. This involves no departure from the company's strictly conservative financial policy, for the payment appears from the preliminary statement to take well under a quarter of the surplus available for dividends and reserves. The yield on the shares is just on 6 per cent.

Telegraph Condenser

A moderate reduction last year in the profits of the Telegraph Condenser Company was ascribed mainly, at the recent annual meeting of the company, to the new Canadian subsidiary, which had to bear the initial expenses of factory construction. Profits of the holding company were substantially maintained, and from a net surplus of £131,000, after tax, the dividend is being kept to the rate of 20 per cent paid on the three previous occasions. Speaking of this year's outlook, the chairman described the order book as slightly larger than it had been twelve months earlier, but saw some signs of contracting demand from the radio and television industry, and a persistence of keenly competitive conditions. He spoke confidently of the long-term prospect, with particular reference to the policy of broadening further the scope of the company's activities. The 10s shares have been quoted lately at 35s, to yield a little over 7 per cent.

REPORTS and DIVIDENDS

Babcock & Wilcox, Ltd.—The report and accounts for 1957 now issued confirm the preliminary figures given in our issue of 2nd May. In his circulated review of the year, Mr. W. L. Fraser (chairman) says that they have again been able to devote substantial sums to the provision of new plant and equipment in all the group works at home and overseas. In addition, the arrangements which have been made with the Ministry of Supply for the purchase of the greater part of the plant and machinery at the Dalmuir Ordnance Factory and the leasing of the premises from 1st January, 1959, put into effect their intention to increase their facilities for the fabrication of heavy pressure vessels, as well as other activities.

The turnover last year constituted a new record, but with the rise in wages and other costs, the profit margins have been correspondingly reduced. During the year the English Electric, Babcock & Wilcox, Taylor Woodrow Group was awarded the contract for a 500 MW nuclear power station at Hinkley Point. The company will manufacture and erect the two reactor pressure vessels. Other items to be supplied include some 13 miles of pipework and hundreds of large and small valves, as well as a 400-ton Goliath crane to be used in the erection of the station, with a further 20 cranes of varying sizes for operational work in the completed station.

Advances in conventional power plant have been considerable. The astonishing increase in boiler sizes in recent years and the breaking through the barrier of critical pressure have been most significant. These achievements will have a marked effect on future costs of power generation. The company has made long-term arrangements with its associated companies in France, Germany and Spain for the pooling of certain research and its results, and for the rationalising of studies in engineering development.

Among their home subsidiaries, Bailey Meters & Controls, Ltd., successfully maintained and even improved production in cramped accommodation pending the building of their new works and the transfer of some activities to the new site. Of their overseas subsidiaries the most notable performance was that of Babcock & Wilcox of Australia, Pty., Ltd., which reached a fresh record of turnover in 1957. Recently a large contract was secured from the State Electricity Commission of Victoria, at Yallourn, where a boiler plant of special design is being installed to meet the unusual combustion conditions of brown coal.

In a general review of prospects, Mr. Fraser says that industry as a whole has of late been encountering in all parts of the world intense competition, rising costs of labour and materials, restrictions and burdensome taxation. These could retard their progress for the time being if there were no improvement.

Lancashire Dynamo Holdings, Ltd.—New records in both turnover and profit are reported by Mr. S. F. Steward (chairman and managing director) in his review of the group's activities for 1957, although he reminds stockholders that allowance must be made for the inclusion for the first time of the results of J. G. Statter & Co., Ltd. The profits of this new subsidiary have fully reached expectations and have provided an adequate return on the capital invested. Although profit margins were smaller in face of rising costs and keener competition, their spread of interest and range of products enabled them to maintain their position. As a result of increased productive facilities now coming fully into operation almost every company in the group inceased its output and for the first time for many years the total output from their factories was slightly in excess of incoming orders. They have established a new subsidiary, Lancashire Dynamo Group Sales, Ltd., with the object of co-ordinating the sales effort of their companies and exploiting to the full the group's wide range of activities in the electrical field.

Dealing with the activities of the various companies in the group, Mr. Steward says that a record output of rotating electrical machinery with a pronounced trend towards machines of higher output, made heavy demands on the production space at the Trafford Park Works of Lancashire Dynamo & Crypto, Ltd. The completion of the new office building and research laboratories and the acquisition of an additional site near the works are making available additional space in the main works which will improve the layout and flow of production. The demand for larger machines and the development of new types to meet nuclear power requirements has placed a considerable burden on the design and development facilities at this works and the extra costs involved have had their effect on the profits. Although output at the Willesden works, with its subsidiary establishment at Irchester, has been fully maintained, the order book and profit margins are beginning to reflect the more competitive conditions now prevailing.

The output and orders of Foster Transformers, Ltd., have been well maintained, orders being well in excess of last year and at a record level. A new bay has now been completed. Orders and output of J. G. Statter & Co., Ltd., were both in excess of the previous year. Extensions are in hand at Amersham which will result in improved facilities for fabrication and an increase in capacity. The products of the company are in use in more than 70 countries.

Lancashire Dynamo Electronic Products, Ltd., has maintained its lead in the field of industrial electronic equipment, and both output and orders have again risen substantially. A new extension completed during the year has increased the productive capacity by 25 per cent and provides for the further expansion in turnover planned for 1958. A number of new and advanced products have reached the manufacturing stage.

The transfer of Lancashire Dynamo Nevelin, Ltd., to the works at Oxted at the beginning of 1956 is now beginning to bear fruit. Increased orders were obtained both for the rectifier and switchgear divisions and the total output achieved was the highest in the company's history. An important development in the mercury-arc rectifier field has been the introduction of the steel tank "Nevitron" which may well replace the glass bulb rectifier for many important applications in the future.

Crypton Equipment, Ltd., which produces electrical testing and servicing equipment for motor vehicles, introduced during the year over 30 new items of equipment, including the Crypton "Motormaster." Automotive and industrial equipment was exported to over 60 countries during the year. Both output and orders show a substantial increase over the previous year.

Crypto, Ltd., manufacturing food preparation machinery, has again had a good year; the extension of its works in North-West London has now been completed. Dynamo & Motor Repairs, Ltd., which provides service for the repair and maintenance of electrical machinery, has during its first year as a wholly-owned subsidiary, increased its turnover.

Despite increasing difficulties arising from import controls and the growth of local manufacture, the total export business has increased. Mr. Steward refers to the group's participation in Rustyfa, Ltd., a consortium of companies which is supplying a tyre factory for Russia, and says their share of this contract comprises a major portion of the electrical plant for the factory, including a number of large motors, special variable speed drives and complete electronic controls. Speaking of nuclear power development, he says that they already have in hand motors totalling over 60,000 h.p. for one of the new nuclear power stations.

The Automatic Telephone & Electric Co., Ltd.—In his review of the group's activities for 1957, to be presented at the annual meeting on 28th May, Sir Thomas Eades (chairman) says that although they entered 1958 with a full order book, their manufacturing programme for this year does not show the expansion over 1957 that was anticipated at the last annual

meeting. This is partly due to the fact that the Post Office expenditure programme for 1958 and 1959 has been cut back as part of the Government's plan to restrict the expenditure of nationalised industries.

Group sales in 1957 reached a record level, but world economic conditions evidence a slackening in large orders for 1959-60 delivery. Referring to the decision of the Post Office eventually to install, on a nation-wide basis, subscriber trunk dialling, the chairman says that they, with others in the industry, have been actively engaged, together with Post Office engineers, in the initial conversion of the first city. As a prerequisite this will entail linking the automatic telephone exchanges in the Bristol area into one integrated unit.

In the export field 1957 was a period of intense activity, but for economic and competitive reasons, including the tendency in some countries towards Government to Government trading, business in many overseas markets requires increasing attention and the initiation of new ideas and practices. The demand exists but assistance in connection with the finance is increasingly important.

Turning to research, the chairman says that the Highgate exchange, which is expected to lead to the opening of the first electronic telephone exchange in public service in this country, is but one of many developments which they are undertaking. Another example was the installation by them of the magnetic drum director at the Lee Green automatic exchange in London. For more than a year a partly electronic, partly mechanical exchange has been in service at their research laboratories in Taplow and shows great promise. Although rapid strides are being made in the development of electronic exchanges, it will be many years before they will replace, on a commercial basis, the present electro-mechanical systems. Their programme of research and development continues at the Taplow laboratories of British Telecommunications Research, Ltd., which is operated in conjunction with British Insulated Callender's Cables, Ltd. One notable development is the coaxial cable system for New Zealand. Sir Thomas concludes his statement with brief reviews of the activities of the subsidiary companies.

Camp Bird Acquisition.—A 75 per cent interest in A. Prince Industrial Products, Ltd., sole importers and distributors in Great Britain for several West German manufacturers, has been acquired by Camp Bird, Ltd. Companies represented by Prince Industrial Products include: Blaupunkt (Blue Spot)—radio, radiograms and television; Akkord—quality portable radio sets; Uher—tape-recorders and dictating machines; and Dual—record players and electric razors. Mr. J. Dalgleish, chairman of Camp Bird, will be chairman of the company, and Dr. A. Prince will continue as managing director. Administrative headquarters will be at Camp Bird House, Dover Street, London, W.1, from 1st June.

Johnson & Phillips, Ltd.—The preliminary statement of the financial results for 1957 shows a group trading profit of £405,637, as compared with £321,507 for 1956, to which is added £24,704 income from investments and £50,000 profit on sale of investment. After deducting interest, depreciation, etc., and £98,000 for taxation, the net profit is £91,245 (against £33,565). After payment of preference dividends, which require £32,844, and adding £147,886 brought in, the balance available is £206,287. No interim ordinary dividend was paid and it is now proposed to pay a dividend of 5 per cent for the year. The total payment for 1956 was 10 per cent. The balance carried forward is £158,355.

Bowthorpe Holdings, Ltd., reports a gross profit for 1957 of £766,623, as compared with £578,221 for the preceding year, and a net profit of £373,083 (against £284,115). It is proposed to pay a final dividend of 18 per cent (against 25 per cent), making 25 per cent (37½ per cent) for the year. The 1957 dividend is paid on capital doubled by a scrip issue.

G. N. Haden & Sons, Ltd.—The group trading profit for 1957, after all charges, but before taxation, amounts to £421,543, as compared with £299,769 for the previous year. Taxation absorbs £238,082. It is proposed to pay a dividend for the year of 15 per cent, and a bonus of 2½ per cent, making 17½ per cent. For the previous year the distribution was 12½ per cent.

Parnall (Yate), Ltd.—In his statement, circulated with the report and accounts for 1957, the Earl of Limerick (chairman) says that turnover in electrical domestic appliances was over 30 per cent higher than in 1956. This was partly attributable to all types of washing machines and was partly a result of the introduction of the "Auto-Dry" clothes dryer; the trade in this appliance for 1957 was substantially greater than they expected when it was introduced. Since the acquisition of Ascot Lamps & Lighting, Ltd., they have been acquiring additional plant and equipment and installing it, as well as rearranging the layout of the various units in the existing buildings at Dalston. Although considerable progress has been made in the re-equipment programme, they have not yet completed the main part of that programme, although they anticipate that this will be completed during 1958. While this work and expenditure have been in progress the staff have increased substantially the total volume of lamps being manufactured. Stockholders, however, must not expect a return on this investment until the re-equipment and establishment of the business has been completed. Although the Australian company did not reach the profit-earning stage in 1957, nevertheless the accounts show an improvement and the turnover has increased. The proportion of its products which are partly or wholly manufactured in Australia is increasing and this, coupled with an enlarged import quota, will ensure continuity of supply to Australian customers.

In 1957 they exported, as a group, goods to the value of approximately 10 per cent more than in 1956. Since the end of 1957 severe restrictions have been introduced in New Zealand, which is a territory where they do considerable business, and this is bound to have an adverse effect upon their overseas sales for 1958. In recent years, in territories where local restrictions make the importation of goods from the United Kingdom difficult, they have entered into licensing arrangements with local manufacturers whereby their products are produced within the territory.

Holophane, Ltd., has declared an interim dividend of 6 per cent (against 7½ per cent) on capital increased by a two-for-three scrip issue.

Heatrae, Ltd., report that after providing £29,850 for taxation, the net profit for the year ended 28th February last is £30,377, as compared with £14,161 for the previous year. It is proposed to pay a dividend for the year of 20 per cent (against 15 per cent).

Bankruptcies

W. R. Perkins, 25, Villiers Avenue, Twickenham, Middx., electrical contractor.—Receiving order made 25th April on a creditor's petition.

E. Horton, 9, Leonard Street, Beverley Road, Hull, electrician.—Public examination 2nd June at the Guildhall, Hull.

S. N. Quinion, 9, Charleville Road, West Kensington, London, W.14, electrical engineer, trading as Joy & Co.—Trustee, Mr. A. A. Walter, Bankruptcy Buildings, Carey Street, London, W.C.2, Official Receiver, released 29th April.

G. G. Brittain, 1, Bromley Common, Bromley, Kent, radio, television and electrical engineer and retailer.—First meeting to-day (Friday), at 58-61, York Terrace, Regent's Park, London, N.W.1. Public examination 3rd July at the County Court, Scarbrook Road, Croydon, Surrey.

W. Leeming, formerly carrying on business at 32, Hayfield Road, Salford, and lately carrying on business at 287, Broad Street, Salford, under the style of Leeming Electrics, as an electrical goods retailer.—Public examination 22nd July at the Court House, Encombe Place, Salford.

O. E. Harford, Mount Charles Road, St. Austell, Cornwall, electrical contractor and dealer.—First and final dividend of 3s 2d in the £, payable at 4, Tregarne Terrace, St. Austell.

Liquidations

Wheeler & Pearce, Ltd., 73, Milton Street, Sheffield, electrical engineers and contractors.—Liquidator, Mr. P. Cardwell, 93, Queen Street, Sheffield, 1, appointed on 17th April with a committee of inspection.

John Downton (Electric), Ltd., Heaton Works, Potter Street, near Harlow, Essex, electrical equipment manufacturers.—Winding up voluntarily. Liquidator, Mr. D. H. A. Gray, Westminster Bank Chambers, Epping, Essex, appointed 24th April.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 21st May from the Patent Office, 25, Southampton Buildings, London, W.C.2

1953

24152. Cinema-Television, Ltd.—Cathode ray tube envelopes and methods of making same. 1st September, 1954. (795338.)

24338. Electric & Musical Industries, Ltd. —Transistors. 3rd September, 1954. (795305.)

1954

17993. Metropolitan-Vickers Electrical Co., Ltd.—Electrical spark discharge switching apparatus. 15th June, 1955. (795307.)

25578. Electric & Musical Industries, Ltd. —Electric resistances. 12th August, 1955. (795465.)

25818. Hobson, A.—Current transformers. 17th August, 1955. (795188.)

26745. Ex-Cell-O Corporation.—Fluid pressure servomotor control valves. 15th September, 1954. (795237.)

29971. British Tabulating Machine Co., Ltd.—Electromagnetic relays. 18th October, 1954. (795342.)

30373. Siemens & Halske Akt.-Ges., and Allgemeine Electricitats Ges.—Junction transistors. 21st October, 1954. (795466.)

33720. Plessey Co., Ltd.—Control devices for reversible fluid-pressure motors. 11th November, 1955. (795239.)

34067. Brown Boveri & Co., Ltd.—Arrangement for testing the overspeed safety devices of steam turbines. 24th November, 1954. (795345.)

36047. British Telecommunications Research, Ltd.—Alarm arrangements suitable for use in telecommunication systems. 29th November, 1955. (795347.)

37141. Sulzer Frères Soc. Anon.—Regulating the temperature of super-heated steam in a steam generator. 23rd December, 1954. (795381.)

1955

242. British Broadcasting Corporation.—Compression of band-width of television signals. 4th January, 1956. (795193.)

1431. Centre d'Etude et de Developpements de l'Electronique Cedel.—Electromagnetic deflecting coils or electric transformer coils. 17th January, 1955. (795469.)

6993. Telefonaktiebolaget L. M. Ericsson.—Gaseous electric discharge apparatus for controlling electromagnetic waves. 9th March, 1955. (795351.)

8487. General Electric Co., Ltd.—Bimetallic elements. 19th March, 1956. (795281.)

9203. Hunt (Capacitors), Ltd., A. H.—Electrical capacitors. 28th March, 1956. (795195.)

9548. Smith & Sons (England), Ltd., S.—Electrical demodulators. 3rd April, 1956. (795196.)

10651. Corning Glass Works.—Cathode-ray tube manufacture. 13th April, 1955. (795472.)

11265. Philips Electrical Industries, Ltd. —Electric discharge tubes. 19th April, 1955. (795282.)

14965. British Dielectric Research, Ltd.—Ceramic dielectric materials. 23rd May, 1956. (795449.)

16373. British Thomson-Houston Co., Ltd.—Control of devices for dividing material. 6th June, 1956. (795284.)

17188. Westinghouse Brake & Signal Co., Ltd., and French, E. L.—Selenium rectifier. 4th May, 1956. (Cognate application 28556, 6th October, 1955.) (795475.)

18278. Imperial Chemical Industries, Ltd. —Electrolytic production of titanium. 13th June, 1956. (795386.)

19333. Siemens & Halske Akt.-Ges.—Centralised railway traffic control systems. 4th July, 1955. (795201.)

19539/40. Goodmans Industries, Ltd.—Vibration generating motors. 6th July, 1956. (795375/6.)

19647. Babcock & Wilcox, Ltd.—Furnace chambers with secondary air supplies. 6th July, 1956. (795252.)

21460. Siemens-Schuckertwerke Akt.-Ges. —Production of semi-conductor elements. 25th July, 1955. (795478.)

22490. Tyszkiewicz, S.—Device operable by electrical pulses for impressing conventional signs (figures, letters and the like). 4th August, 1955. (795256.)

23151. Thor Corporation.—Clothes washing machine. 11th August, 1955. (795301.)

23481. British Thomson-Houston Co., Ltd.—Ventilating plants. 8th August, 1956. (795358.)

27670. Oldham & Son, Ltd., and Oldham, E.—Portable lighting devices. 13th September, 1956. (795362.)

28469. Lucas (Industries), Ltd., J.—Electromagnetic relays. 6th October, 1955. (795363.)

31615. Plessey Co., Ltd.—Variable resistors and potentiometers. 24th October, 1956. (795393.)

32291. British Tabulating Machine Co., Ltd.—Electronic digital calculating equipment. 8th November, 1956. (795365.)

33029. Lucas (Industries), Ltd., J.—Double-purpose electric switch for controlling electric circuits and particularly motor-cycle equipments. 12th November, 1956. (795207.)

33086. English Electric Co., Ltd.—Position indicating devices. 15th November, 1956. (795395.)

33512. Santon, Ltd.—Rotary electric switches. 23rd November, 1956. (795366.)

36727. General Electric Co.—Concerning hydraulic amplifier devices and systems. 22nd December, 1955. (795399.)

36912. Bendix Aviation Corporation.—Phase comparator applicable to direction determination of a target. 23rd December, 1955. (795266.)

1956

51. Research Corporation.—Systems for energising electrostatic precipitators. 2nd January, 1956. (795267.)

1158. British Insulated Callender's (Submarine Cables), Ltd.—Armoured cable joints and terminations. 11th January, 1957. (795400.)

3331. Sperry Rand Corporation.—Servomechanism systems. 2nd February, 1956. (795213.)

3569. Siemens & Halske Akt.-Ges.—Start-stop teleprinter receivers. 6th February, 1956. (795318.)

4102. Grisley, F.—Electric switches. 8th February, 1957. (795214.)

5359/60. Thor Corporation.—Washing machine. 11th August, 1955. (Divided out of 795301.) (795302/3.)

6589. Svenska Aeroplan Aktiebolaget.—Rotatable electrical connector for a towing cable provided with an inner conductor to a towed or towing object or craft. 2nd March, 1956. (795322.)

6836. United Kingdom Atomic Energy Authority.—Nuclear reactors. 4th March, 1957. (795406.)

7453. Dale Electric (Yorkshire), Ltd.—Cable reel or drum cradles. 8th January, 1957. (795487.)

7551. Electric & Musical Industries, Ltd. —Manufacture of magnetic transducing heads. 4th March, 1957. (795486.)

7922. Crabtree & Co., Ltd., J. A., Wintle, T. D. G., and Jelley, G. A.—Electromagnetic contactors. 18th January, 1957. (795369.)

9815. Shawinigan Chemicals, Ltd.—Low voltage connections for electrode furnaces. 29th March, 1956. (795219.)

9931. Philips Electrical Industries, Ltd.—Electroluminescent elements. 29th March, 1956. (795220.)

11719/20. British Dielectric Research, Ltd.—Ceramic dielectric materials. 16th April, 1957. (Addition to 795449.) (795450/1.)

15901. Standard Telephones & Cables, Ltd.—High frequency electric attenuators. 23rd May, 1956. (795415.)

17281. Bosch Ges., R.—Electric accumulators. 5th June, 1956. (795330.)

17530. Dishmaster Appliances, Ltd.—Dish washing machines. 6th June, 1956. (795332.)

19134. Stichting Reactor Centrum Nederland.—Performance of nuclear fission reactions and apparatus therefor. 20th June, 1956. (795421.)

22996. Philips Electrical Industries, Ltd. —High-tension supply circuit arrangements. 25th July, 1956. (795425.)

23110. Erie Resistor Corporation.—Printed circuit. 26th July, 1956. (795426.)

24848. Albiswerk Zurich Akt.-Ges.—Reflectors for microwave antennæ. 14th August, 1956. (795428.)

25817. Muirhead & Co., Ltd.—Electrolytic recording apparatus. 23rd August, 1956. (795294.)

26071. Bosch Ges., R.—Solenoid operated electric switches. 27th August, 1956. (795336.)

26952. Bosch Ges., R.—Commutators for dynamo-electric machines. 4th September, 1956. (795431.)

27844. English Steel Corporation, Ltd.—Electrode holders for welding machines using continuous electrodes. 12th September, 1956. (Addition to 761325.) (795165.)

30139. General Electric Co.—Magnetic latches suitable for refrigerator doors. 3rd October, 1956. (795435.)

30425. Telefunken Ges.—Manufacture of grid electrodes for discharge tubes. 5th October, 1956. (795168.)

34299. Standard Telephones & Cables, Ltd.—Repeaters for carrier communication systems. 9th November, 1956. (795297.)

1957

1019. British Thomson-Houston Co., Ltd. —Lampholders for double-ended electric lamps. 10th January, 1957. (795439.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 23rd May:—

SYNCROMATIC. No. 772,057. Class 8. Electric shaving instruments, etc.—Ever-Ready Razor Products, Ltd., 26-28, Bedford Row, London, W.C.1.

DANFOSS. No. B748,314. Class 9. Thermometers, electric sockets, electric plugs, gauges, transformers, liquid level indicators, electric reversers and thermostats; pressure and temperature operated electric switches; switches controlled by photo-electric and magnetic means, etc.—Mads Clausen, trading as Danfoss, Denmark. Address for service, c/o Wildbore & Gibbons, 101, Leadenhall Street, London, E.C.3.

SILVERAMA. No. 773,413. Class 9. Cathode ray tubes.—Radio Corporation of America, New York. Address for service, c/o A. M. & W. Clark, 5-9, Quality Court, London, W.C.2.

MERIDIAN. No. 773,927. PYROLOID. No. 773,928 and MIRROSPEED. No. 774,341. Class 9. Electrodes for electric arc welding.—Quasi-Arc, Ltd., Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

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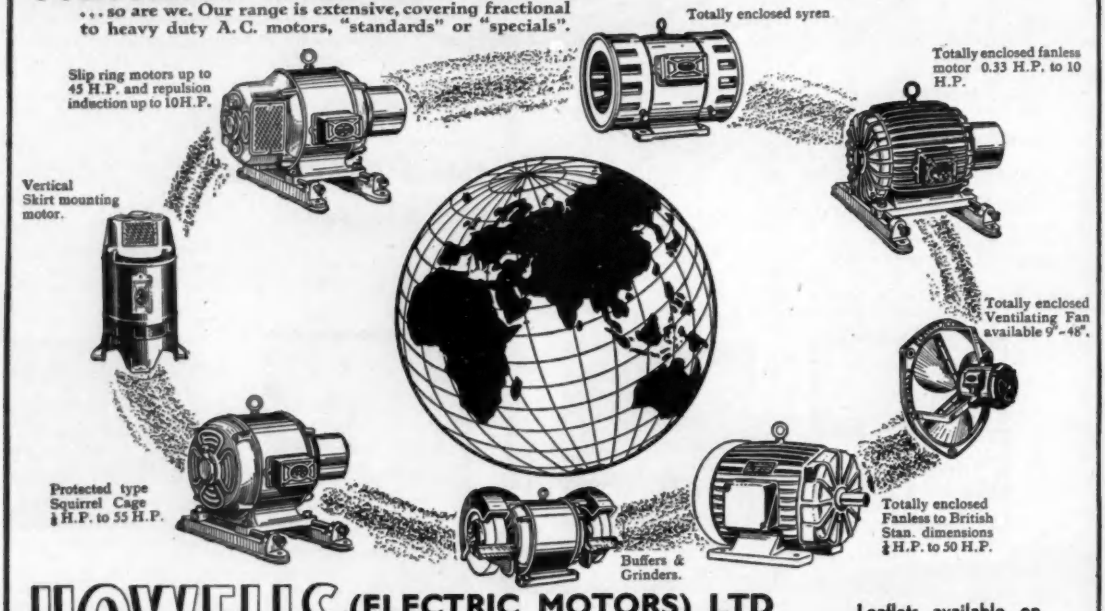
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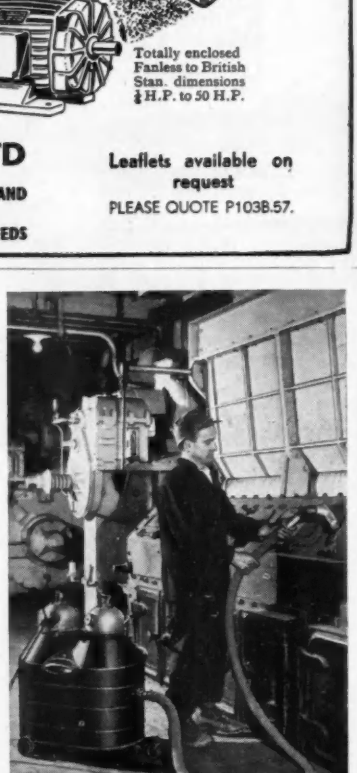

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N26

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Argentina.—Water and Electricity Board. 23rd July. Construction works for Agua Del Toro hydro-electric station. 7th August. Electro-mechanical plant (station to have an installed capacity of 100 MW). (E.S.B. 11513/58. Ten/32313.)*

Burma.—Burma Purchase Board, Rangoon. 26th May. Dry cells for telephones. (E.S.B. 11774/58. Ten/32322.)* Torch covers. (E.S.B. 11775/58. Ten/32336.)*

Formosa.—Central Trust of China, Taipei. 2nd June. Power cable and porcelain wall bushings. (E.S.B. 11493/58.I.C.A. Ten/32280.)* 4th June. Thirty-nine motors. (E.S.B. 11499/58.I.C.A. Ten/32282.)*

France.—Supreme Headquarters, Allied Powers Europe, Paris. 26th May. Three 250 kW diesel generators. (E.S.B. 12116/58. Ten/32376.)*

India.—Neyveli Lignite Corporation (Pte.), Ltd. 5th June. Flexible cables and coupling boxes. (E.S.B. 11575/58. Ten/32277.)*

Kerala State Electricity Board, Trivandrum. 8th July. 110 kV, 66 kV and 11 kV switchgear and ancillary equipment. (E.S.B. 11580/58. Ten/32302.)*

Stores Purchase Committee, Government of Mysore, Bangalore. 15th July. Transformers. (E.S.B. 11584/58. Ten/32286.)*

Korea.—Government Office of Supply, Seoul. 25th May. Telephone apparatus. (E.S.B. 11853/58.I.C.A. Ten/32332.)*

Midlothian.—County Council. 20th June. Street lighting equipment. (See this issue.)

North Cotswold.—R.D.C. 31st May. Two electrically operated centrifugal booster pumps, for sewerage scheme. John H. Haiste & Partners, civil engineers, 8-10, Southgate Street, Gloucester.

Northampton.—R.D.C. 26th May. Electrically driven sewage pumps. Surveyor, 1, Cheyne Walk.

Philippines.—National Power Corporation, Manila. 28th May. Earthing materials and accessories for transmission line. (E.S.B. 11705/58. Ten/32325.)*

Preesall.—U.D.C. 28th May. Centrifugal pumps, electric motors and ancillary plant. S. H. Senior, surveyor, Council Offices.

Rhodesia and Nyasaland.—Federal Tender Board, Causeway. 23rd May. Radioisotope equipment. (E.S.B. 11522/58. Ten/32271.)*

Ministry of Posts. Companies wishing to be placed on approved list of suppliers of telegraph and telephone equipment should apply by 23rd May to the Controller of Stores and Transport, Causeway. (E.S.B. 11470/58. Ten/32240.)*

Electricity Supply Commission, Salisbury. 29th May. Rural type transformers. (E.S.B. 12060/58. Ten/32390.)*

Rushden.—U.D.C. 27th May. Electrical water heaters in 54 houses on the Irchester Road estate. A. G. Crowdy, clerk, Council Buildings.

Selby.—U.D.C. 9th June. Street lighting equipment. (See this issue.)

South Africa.—Union Tender and Supplies Board, Pretoria. 22nd May. H.f. telephone equipment. (E.S.B. 11424/58. Ten/32269.)*

Johannesburg City Council. 26th May. Five 1,250 kVA and one 200 kVA transformers. (E.S.B. 12098/58. Ten/32370.)*

Stores Department, South African Railways, Johannesburg. 4th June. One 1,000 kVA outdoor transformer. (E.S.B. 11851/58. Ten/32347.)*

United States.—Department of Interior, Bonneville Power Administration, Portland, Oregon. 28th May. Static series capacitor equipment. (E.S.B. 11429/58. Ten/32256.)*

Uruguay.—Direccion General de Comunicaciones. 24th June. Rectifying unit. (E.S.B. 11608/58. Ten/32324.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Durham.—County Education Committee. Electrical installation in new Sedgefield Modern School (£7,463).—North of England Engineering & Electrical Co.

London.—L.C.C. Accepted. Renewal and improvement of the electrical installation at Strand County Secondary School, Elm Park, Brixton (£5,134).—H. A. Lamb & Sons.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Allendale.—Secondary school (£58,000); J. H. Newman & Son, builders, Eastgate, Hexham.

Alnwick.—Remodelling of the Duke's Grammar School (£62,000); J. G. Green & Sons, builders, Warkworth.

Ashington.—Grammar school (£195,000); R. W. Bell & Co., Ltd., builders, Mistletoe Road, Newcastle-on-Tyne.

Bangor (North Wales).—Department of Applied Electricity for University College of North Wales; Pochins, Ltd., builders, King Street Works, Middlewich.

Barry.—Twenty shops with separate maisonnettes, Calcot estate; borough surveyor, Town Hall, Holton Road, Barry, Glam.

Bedford.—Works extensions (£175,000) for W. H. A. Robertson, Ltd., Lynton Road; Richard Costain, Ltd., 111, Westminster Bridge Road, London, S.E.1.

Billingham-on-Tees.—Houses (100), for industrial workers; U.D.C. surveyor.

Fifteen shops, flats and maisonnettes, Queensway, for Ravenseft Properties, Ltd.; Fewster & Partners, architects, 22, Conduit Street, London, W.1.

Bognor Regis.—Holiday camp; staff architect, Butlins, Ltd., 439, Oxford Street, London, W.1.

Bournemouth.—Convalescent home and 52 flats, West Cliff Road; National Deposit Friendly Society, 58, Buckingham Palace Road, London, S.W.1.

Bristol.—Coach garage, Passage Road, Henbury; Red Rose Coaches, 24, Satchfield Crescent, Henbury.

Burton-on-Trent.—Group laundry at Andressey Hospital (£35,000); Birmingham Regional Hospital Board, 10, Augustus Road, Edgbaston, Birmingham, 15.

Caernaryon.—Dwellings (50), Tryn and Ty Gwen site; J. Isgoed Williams, architect, Part yr Afon, Penmaenmawr.

Chelmsford.—John Payne R.C. Secondary School, Hill Lane; R. A. Boxall, architect, 81, Moulsham Street.

Cheltenham.—Junior and infants' school and special day school for educationally subnormal children, as extensions to Monkscroft County Primary School; county architect, County Hall, Gloucester.

Chester.—Factory, Sealand estate; Urfa Light Industries, Ltd., 32, Walker Street, Hoole.

Chigwell.—Houses at Oakwood Hill, Loughton (43), Hornbeam Road, Buckhurst Hill (32) and at Lechmere Avenue, Chigwell (16); Tooley & Foster, Midland Bank Chambers, Buckhurst Hill, Essex.

Clare.—Houses (74), Stoke Road; R.D.C. surveyor.

Colchester.—Additions and alterations to Marylands Hostel for Elderly Persons, Shrub End (£25,000), and occupation centre for mentally sub-normal persons (£35,575); Essex county architect, County Hall, Chelmsford.

Dagenham.—New transport workshops (£23,000); borough engineer, Civic Centre.

Darlaston.—Dwellings (48), Poplar Avenue; U.D.C. surveyor.

Dingwall.—Additions and alterations to Dingwall New Academy, including electrical work, for Ross and Cromarty C.C.; J. A. Allan, Ross & Allan, architects, 10, Bon Accord Square, Aberdeen.

Doncaster.—Houses (126); J. A. Williams, R.D.C. surveyor, Nether Hall.

Dumfries-shire.—Houses (202); county architect, County Offices, Dumfries.

Durham.—Houses (32), Carville; R. E. Coleman, Ltd., builders, Western Hill, Durham.

Easington.—Miners' hall at Murton (£80,000); N.C.B. Architects' Department, 24, The Side, Newcastle-on-Tyne.

Edinburgh.—Block of warehouses and offices, Jeffrey Street (£120,000); M. Laird, architect, 11, Randolph Place, Edinburgh, 3.

Elland.—Houses (28), Stainland; F. R. Birkhead, surveyor, Council Offices, Elland.

Enfield.—Flats (36), Chapel Street; H. D. Peake, borough engineer, 7, Little Park Gardens.

Epsom.—New offices, etc., proposed (£105,000); Surrey county architect, County Hall, Kingston-on-Thames.

Eston.—Houses and bungalows (47), Teesville East estate; N. C. Harrison, surveyor, 246, Normanby Road, South Bank.

Evesham.—Extensions to Prince Henry's Grammar School (£79,800); R. Y. Logan, director of education, Castle Street, Worcester.

Exeter.—First stage of Students' Union building and refectory, Stocker Road, for University; Staverton Builders, Ltd., Bridge Mills, Totnes.

Filey. — County secondary school (£175,000); county architect, County Hall, Beverley.

Goole.—Factory and stores, Rawcliffe Road; Carlsberg Sales, Ltd., 5, Newdigate Street, Birmingham, 7.

Guildford.—Factory and offices, Station Meadows estate, for Keefe & Lewis, Ltd., Rodborough Buildings; Herbert Ashenden, Ltd., builders, Walnut Tree Close.

Haltwhistle.—Secondary school (£143,000); John Twiname, Ltd., builders, Cockermouth.

Haverhill.—Houses (100); Kerridge (Bldrs.), Ltd., 26/46, Sturton Street, Cambridge.

Hebburn.—Fire station to serve Hebburn, Jarrow and Felling; county architect, South Street, Durham.

Hendon.—Three-storey offices, Highfield Road; Howard Farrow, Ltd., contractors, 1, Russell Parade, London, N.W.11.

Hexham.—Houses (23), Ovington and Acomb, for R.D.C.; W. Dixon & Son, architects, 1, Collingwood Street, Newcastle-on-Tyne.

Leicester.—Teachers' training college, Scraptoft Hall (£327,450); Robert Marriott, Ltd., builders, Midland Works, Rushden.

London. — Flats, Seaton Street and Cremorne Road, Chelsea; Unity Structures, Ltd., 5/15, Cromer Street, W.C.1.

Rebuilding wing of Curzon Street House, Mayfair; A. Roberts & Co., Ltd., builders, 79, Eccleston Square, S.W.1.

Civic centre, Hampstead; Ove Arup & Partners, consulting engineers, 8, Fitzroy Street, W.1.

Offices for Lambeth Housing Department, Brixton Hill/Porden Road corner site; H. Venning & Partners, quantity surveyors, 16, Gower Street, W.C.1.

Loughborough.—Houses (36), Ashby Road estate; William Davis & Co. (Leicester), Ltd., Loughborough.

Maidenhead.—Dwellings (250), Cox Green; C. T. Read, borough surveyor, 14, Craufurd Rise.

Manchester.—R.C. Church of St. Antony, Woodhouse Park; A. Gilbert Scott, architect, 3, Field Court, Gray's Inn, London, W.C.1.

Margate.—Factory premises, 166-168, High Street; Randolph Travel Goods, Ltd., 22, Cazenove Road, London, N.16.

Middlesbrough.—Store, Linthorpe Road, for Marks & Spencer, Ltd.; Norman Jones & Rigby, architects, Lord Street, Southport.

Morpeth.—Infants' school, Spelvit Lane (£27,000); Cawood Wharton & Co., contractors, Harrogate.

Newcastle-on-Tyne.—Technical secondary school (£234,000); Jackson & Sons, builders, Corporation Street, Newcastle (in lieu of tender withdrawn).

Students' hostel at Rutherford College of Technology (£100,000); city architect, 18, Cloth Market, Newcastle.

Oldbury.—First phase of scheme for secondary technical school (£120,500); county architect, 14, Castle Street, Worcester.

Oxford.—East Gallery to Ashmoleum Museum (£70,000); Easton & Robertson, architects, 53, Bedford Square, London, W.C.1.

Penygroes.—Factory for Austin Hopkinson & Co.; Wm. Cowlin, Ltd., builders, Penarth Road, Cardiff.

Plymouth.—Civic centre for Corporation; Hoare, Lea & Partners, heating, ventilating and electrical consultants, 5, Headland Park.

Preston.—Houses (95), Savick estate; borough engineer, Municipal Buildings.

Sanquhar.—Primary school; county architect, County Offices, Dumfries.

Seaton Valley (Northumberland).—Bungalows (31), Westbourne estate; T. W. Burgess, surveyor, Seaton Delaval.

South Cambs.—Houses (40), Bassingbourn, Castle Camps, Linton, Sawston and West Wickham; B. G. Craft, R.D.C. clerk, County Hall, Hobson Street, Cambridge.

Southport.—Houses (55), Staveley Road site, Ainsdale; town planning officer, 99/105, Lord Street.

Spennymoor.—Houses (151), between York Hill Crescent and Tudhoe Colliery; Gray & Partner, architects, Camden Street, North Shields.

Sunbury.—Secondary school on site opposite Manygate Lane (£110,000); Middlesex county architect, 1, Queen Anne's Gate Buildings, London, S.W.1.

Sunderland.—Houses (214), South Johnson Street and Whitehouse Road; H. C. Bishop, borough architect, Grange House, Stockton Road.

Watford.—Factory, Holywell area; A.A. Polishers & Platers, Ltd., Loates Lane.

West Ham.—Eleven-storey block of flats, Capel Road; borough architect.

West Kesteven.—Bungalows and flats (51); R.D.C. surveyor, Watergate, Grantham, Lincs.

West Lothian.—Houses (100), Winchburgh; J. Calder, county clerk, County Buildings, Linlithgow.

Whitley Bay.—Third block of flats at Monkseaton; F. P. Dodsworth, builder, Hillheads Road.

Wigston.—Houses (40), Horsewell Lane; Pick, Everard, Keay & Gimson, architects to U.D.C., 6, Millstone Lane, Leicester.

Wimbledon.—Extensions of St. Teresa's Hospital; H. H. Clark, architect, 7, Victoria Street, S.W.1.

CATALOGUES AND LISTS

BUSHINGS.—Loose-leaf catalogue describing the company's range of heavy duty transformer box bushings moulded in epoxide resin.—**J. R. Ferguson (Electrical Engineers), Ltd.,** Tameside Works, Park Road, Dukinfield, Cheshire.

CABLES.—Illustrated leaflet on welding cables and flexibles.—**Mersey Cable Works, Ltd.,** Linacre Lane, Bootle, Liverpool, 20.

ELECTRIC MOTORS.—Catalogues and leaflets giving particulars of f.h.p. motors, instrument motors and geared motor units in the company's range.—**Klaxon, Ltd.,** 49, Upper Brook Street, London, W.1.

FIXING DEVICES.—Illustrated broadsheet giving particulars of twenty-one different types of "Rawlplug" fixing devices.—**Rawlplug Co., Ltd.,** Cromwell Road, London, S.W.7.

FURNACES.—Catalogue (M.2B) dealing with vertical air circulation electric furnaces.—**Metalectric Furnaces, Ltd.,** Cornwall Road, Smethwick, 40, Staffs.

INSTRUMENTS.—Catalogue giving particulars and prices of Rohde & Schwarz instruments and a list dealing with u.h.f. and microwave components.—**Aveley Electric, Ltd.,** Ayron Road, Aveley Industrial Estate, South Ockendon, Essex.

Eight catalogue sheets dealing with instruments manufactured by the company including live conductor testers, phase sequence indicators and time or cycle counters.—**Everett Edgcumbe & Co., Ltd.,** Colindale Works, Colindeep Lane, Hendon, London, N.W.9.

Brochure (2121) giving information on the company's Type R.T.2 electronic proportional resistance-thermometer controller.—**Sunvic Controls, Ltd.,** P.O. Box 1, Harlow, Essex.

LIGHTING FITTINGS.—Illustrated and priced 24-page catalogue dealing with the company's range of fluorescent lighting fittings including vapourproof and anti-corrosive types.—**Strong Electric Corporation Great Britain, Ltd.,** Whyteleafe, Surrey.

MINIATURE CIRCUIT-BREAKERS.—Brochure giving particulars of the company's Type F-60 range of miniature circuit-breakers.—**J. A. Crabtree & Co., Ltd.,** Lincoln Works, Walsall, Staffs.

NAMEPLATES.—Leaflet describing self-adhesive nameplates introduced by the company.—**Millett, Levens (Engravers), Ltd.,** Stirling Corner, Barnet By-Pass, Boreham Wood, Herts.

NUCLEAR EQUIPMENT. — Brochure describing remote handling equipment for atomic research work, electronic control gear, and special purpose machinery, with text in English, French, German and Spanish.—**Ayling Nuclear Equipment Co.,** Ayling House, Horsham, Sussex.

POCKET LAMP.—Leaflet giving particulars and illustrations of the "Eltex Primalux" rechargeable pocket lamp which is fitted with a small accumulator and miniature charging set to enable it to be recharged by plugging into an outlet socket.—**V. G. Trading & Finance Co., Ltd.,** Fulwood House, Fulwood Place, London, W.C.1.

SIGNALLING SYSTEM. — Illustrated leaflet dealing with the Type 56 locomotive haulage signalling system for mines, together with leaflets on a certified static ringer and a range of junction boxes, changeover switches and cable glands.—**A. T. & E. (Wigan), Ltd.,** Pioneer Works, Wigan.

SOIL EXTRACTORS.—Leaflets illustrating and describing "Wytrac" power driven soil extractors which are available fitted with electric motors.—**Wysall Tractor Co., Ltd.,** Wysall, Notts.

TAPE WINDER.—Coloured leaflet (DP.1) containing a description and illustrations of a new high-speed tape winder to provide automatic tape winding facilities in data processing and communication systems.—**Creed & Co., Ltd.,** Telegraph House, Croydon, Surrey.

TERMINAL BLOCKS.—Leaflet illustrating and describing the "Multi-Lockway" moulded interlocking terminal blocks in 10, 30 and 75 A ratings, to B.S. and C.S.A. specifications.—**Metway Electrical Industries, Ltd.,** Canning Street, Kemp Town, Brighton, 7.

WARNING SIGNALS.—A brochure and leaflets illustrating and describing the company's range of electrically driven sirens, hooters and other warning signals.—**Klaxon, Ltd.,** 49, Upper Brook Street, London, W.1.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Sunday, 18th May, to Tuesday, 20th May

FOLKESTONE.—Electrical Contractors' Association. Annual Conference.

Monday, 19th May

IPSWICH.—Electric House, 7.15 p.m. Ipswich and District Electrical Association. Annual general meeting.

Monday, 19th May, to Friday, 23rd May

LONDON.—Savoy Place, W.C.2. I.E.E. Radio and Telecommunication Section. International Convention on Microwave Valves.

MORECAMBE.—Electrical Trades Union. Annual Policy Conference.

Wednesday, 21st May

ALDENHAM.—Incorporated Plant Engineers, London Branch. Visit to London Passenger Transport Works.

LONDON. — Connaught Rooms, W.C.2, 10.30 a.m. Conference of Standards Engineers.

London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Branch. "Cold-Cathode Voltage Transfer Circuits," by J. H. Beesley.

Brunswick Close Estate, St. John's Street, E.C.1. E.A.W. London Branch. Visit to a new housing block of Finsbury Council.

London School of Economics, Houghton Street, W.C.2, 6 p.m. Royal Statistical Society, Study Section. Annual general meeting, followed by "Long-Term Demands for Fuel," by E. F. Schumacher.

MANCHESTER.—Engineers' Club, 2.30 p.m. Combustion Engineering Association, North Western Region. "Grit and Dust Collecting Equipment for the Smaller Plant," by C. J. Stairmand.

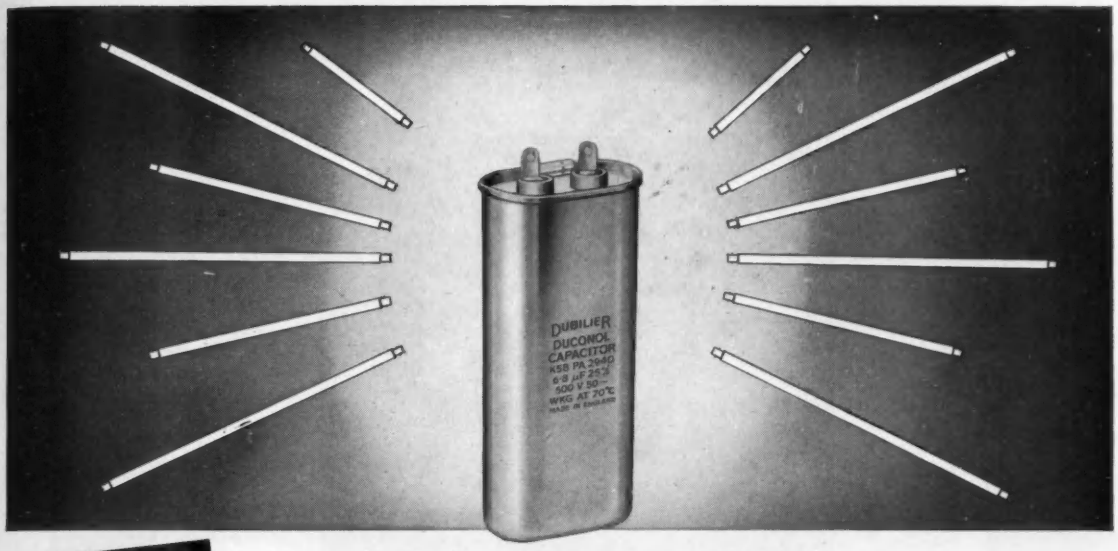
ROCHESTER.—King's Head Hotel, High Street, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Maintenance of Shell Boilers," by J. N. Williams.

Friday, 23rd May

BIRMINGHAM.—Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "Tower Cranes," by Mr. Sutcliffe.

Friday, 23rd May, to Monday, 26th May

PITLOCHRY.—Pitlochry Hydro. I.E.E. Scottish Centre. Spring meeting.



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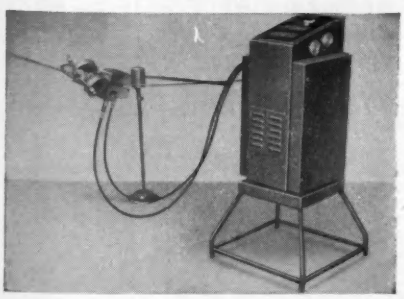

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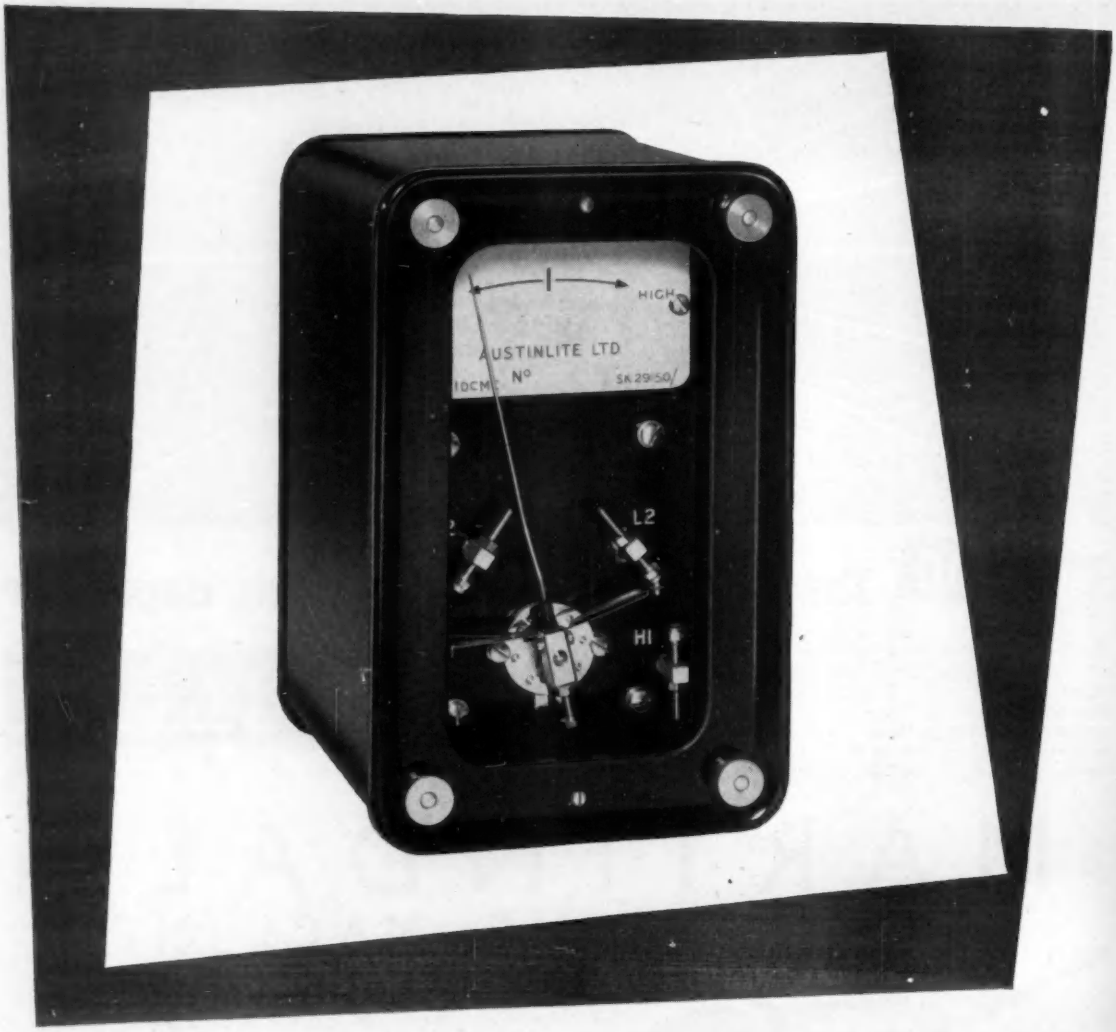

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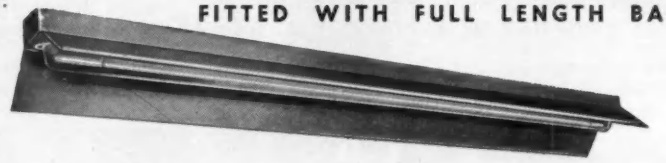

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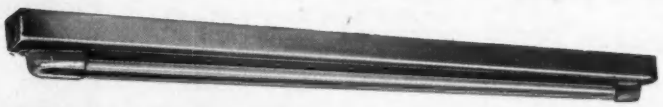

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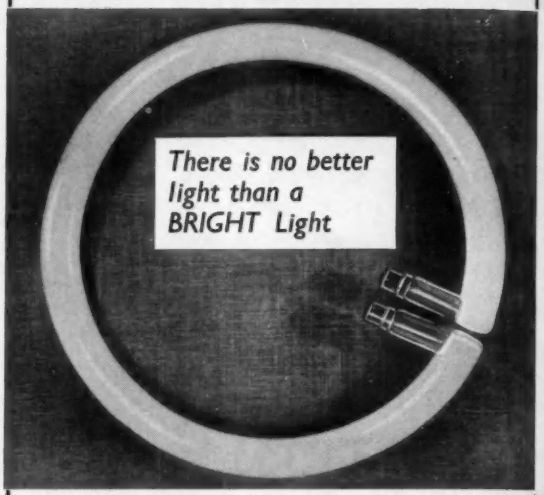

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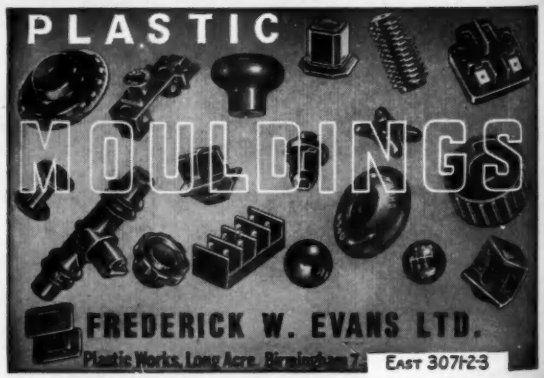
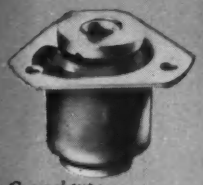
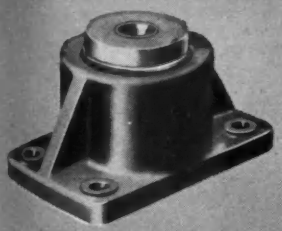




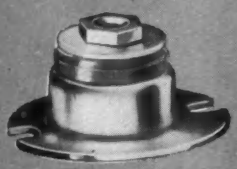
General type (triangular flange)

Pedestal assembly



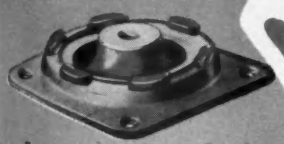
Pedestal mounting

Frustacon type



FN type

Instrument type (pedestal flange)



Instrument type (square flange)

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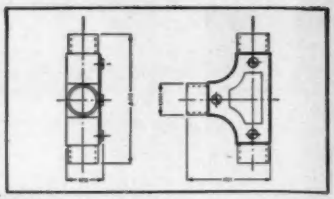

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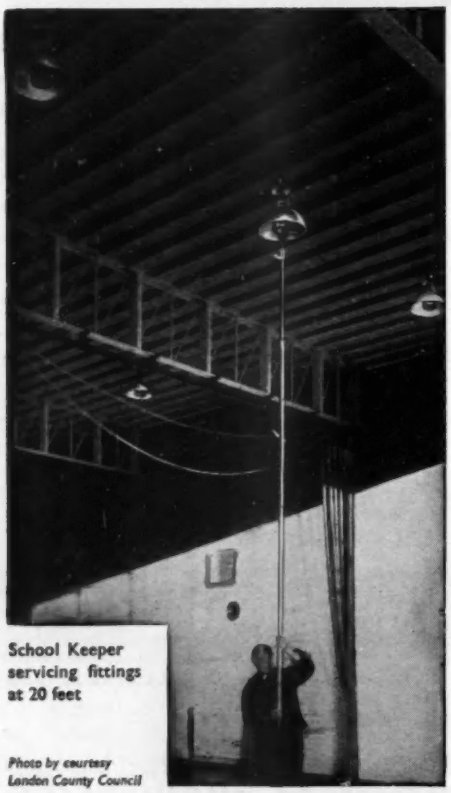

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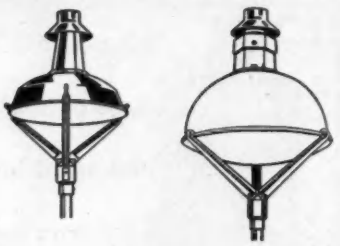
Photo by courtesy London County Council



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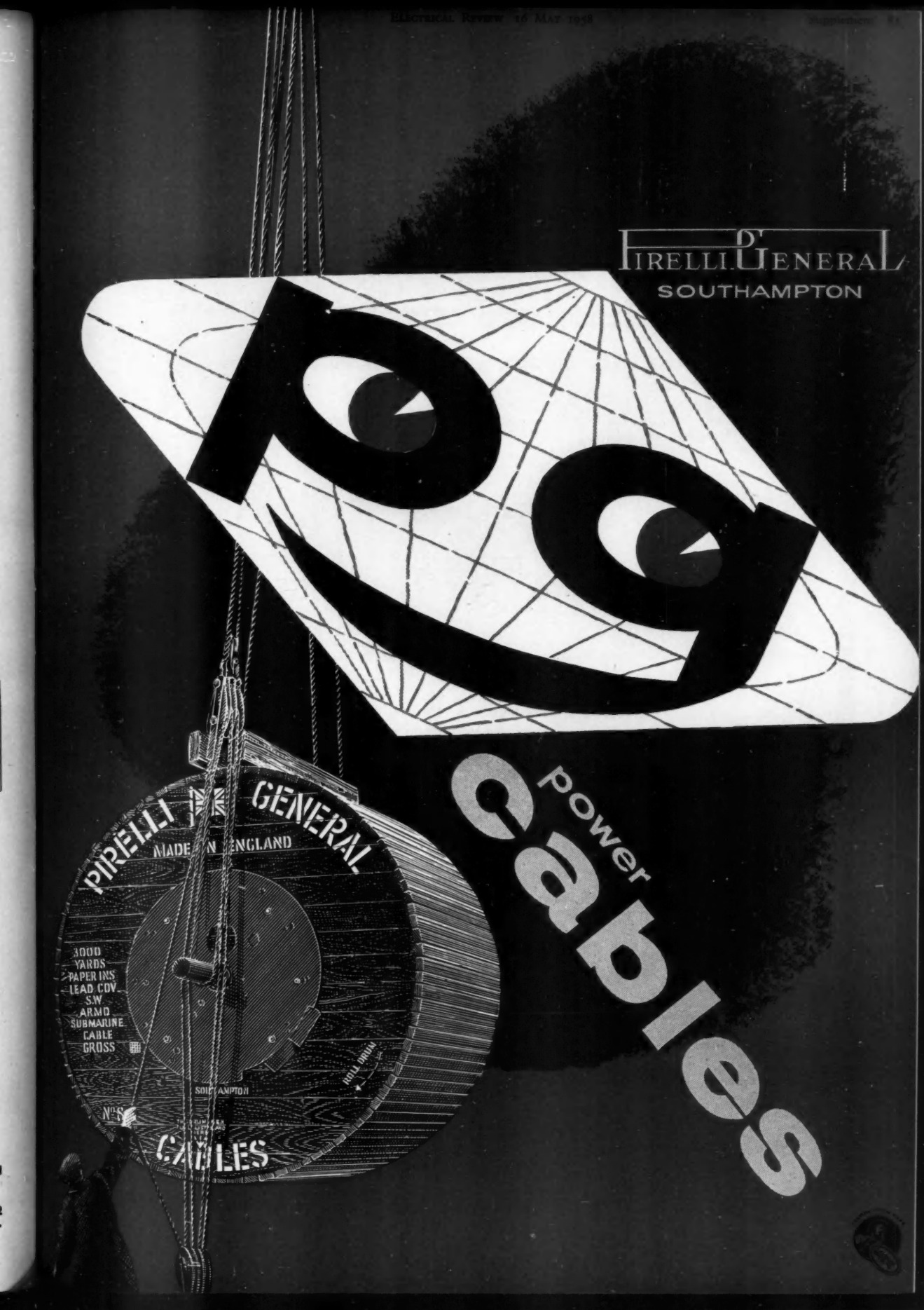
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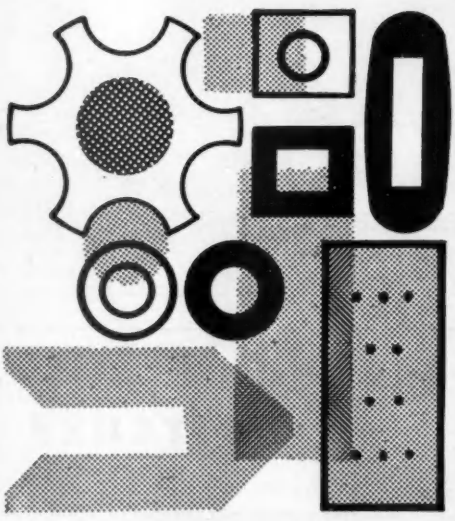

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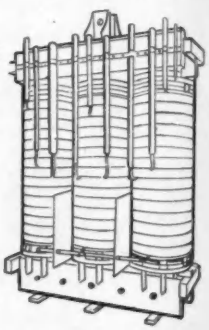

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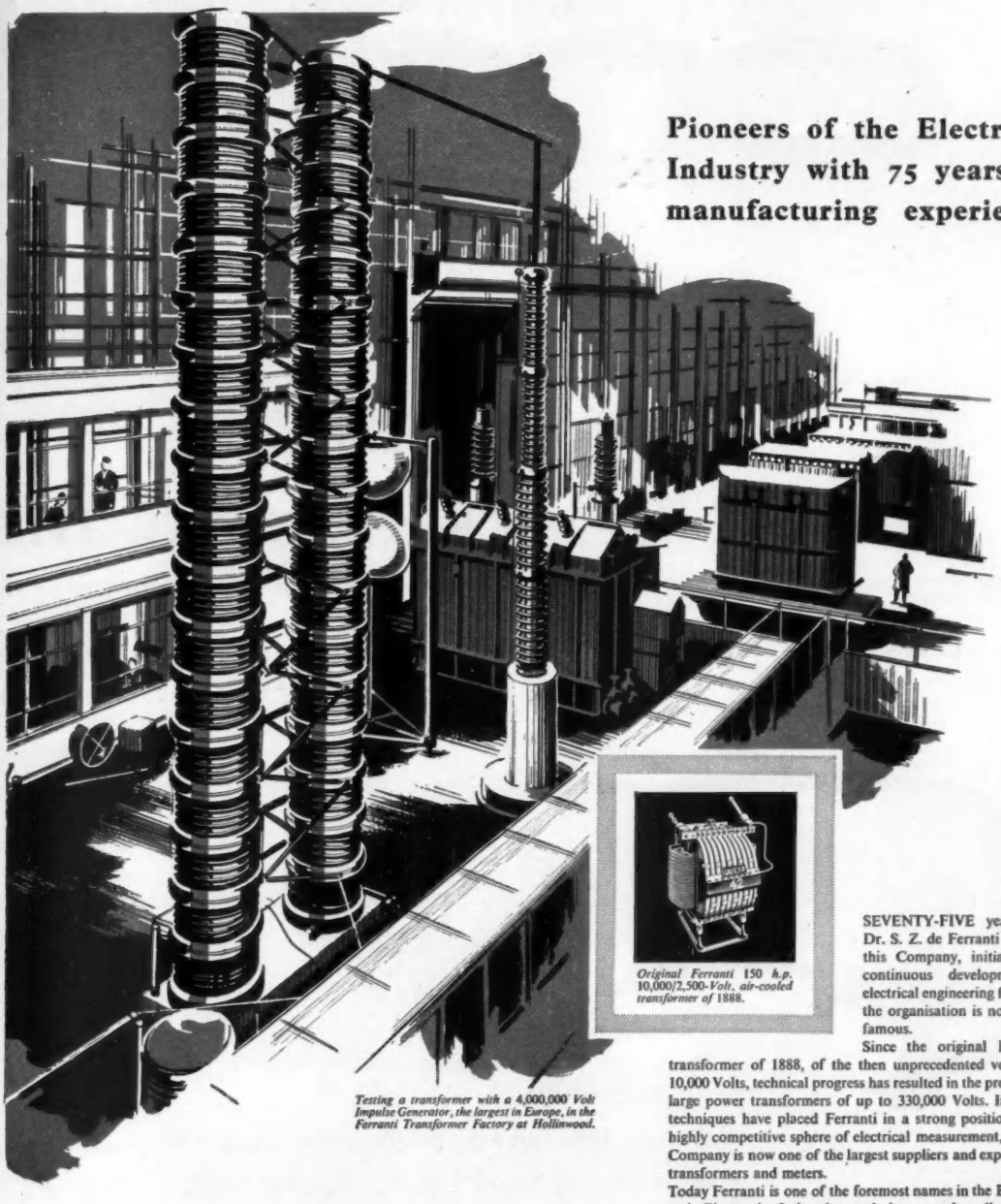

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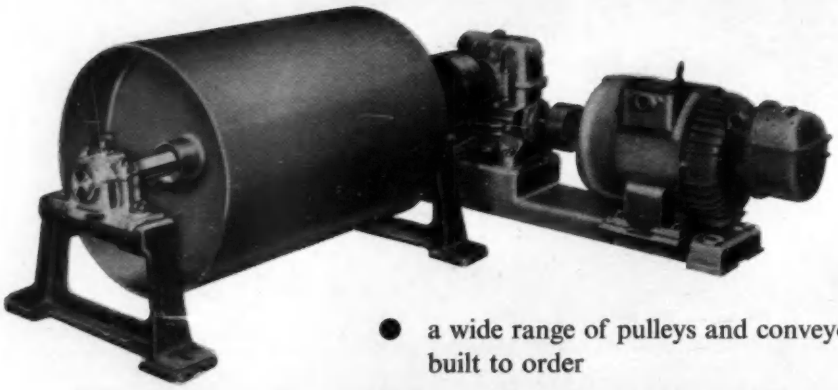

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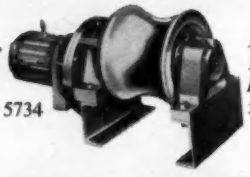

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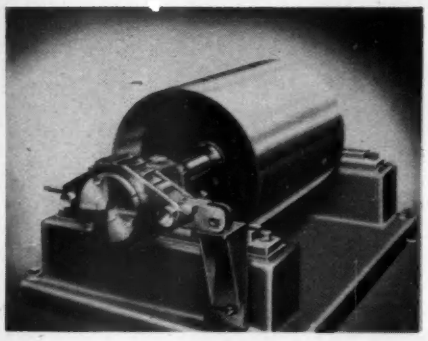

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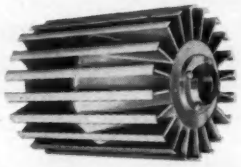

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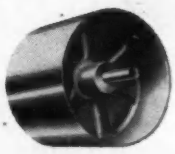

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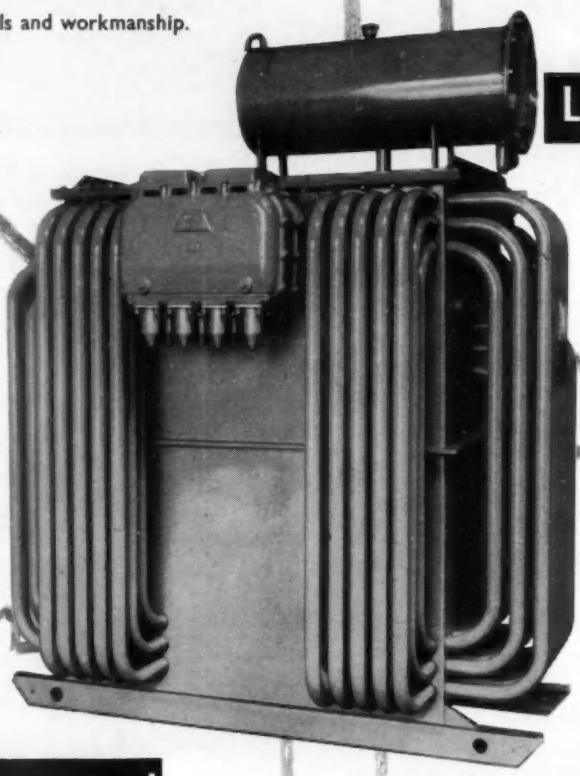

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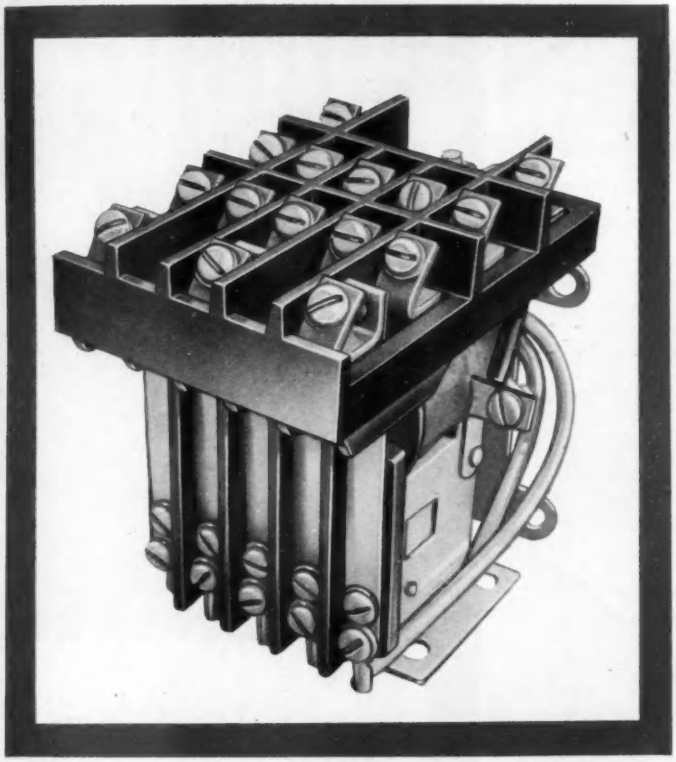

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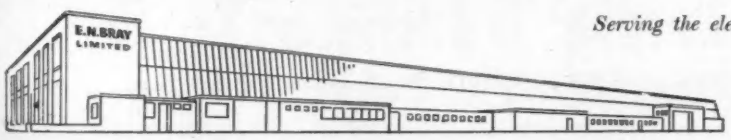

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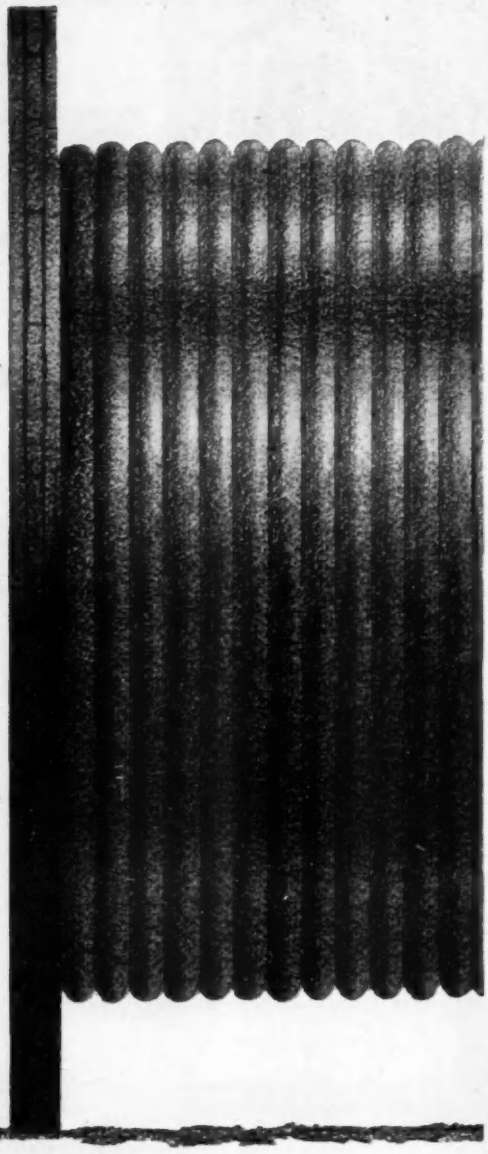

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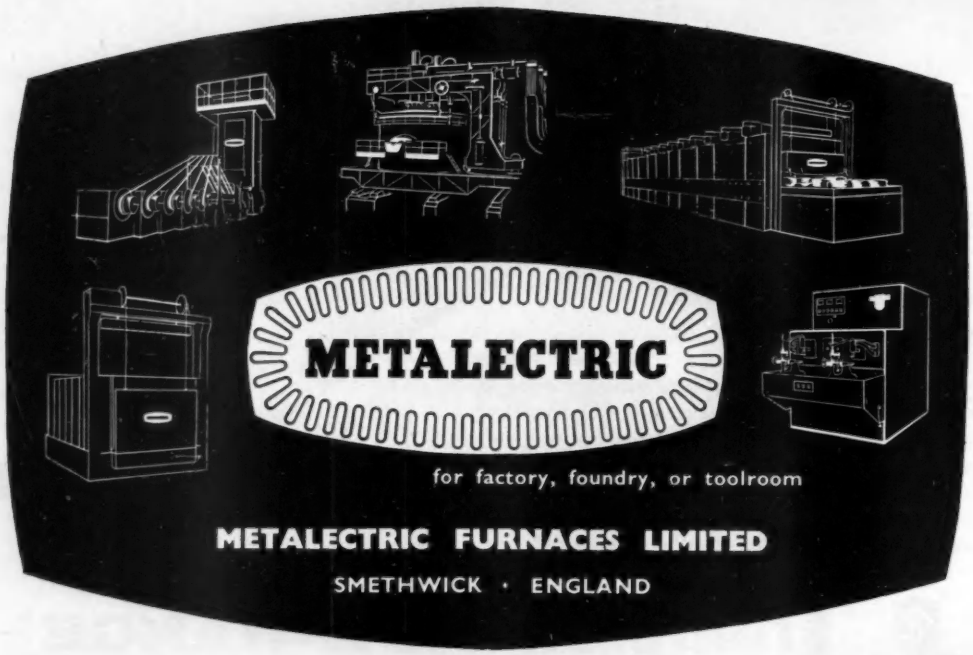

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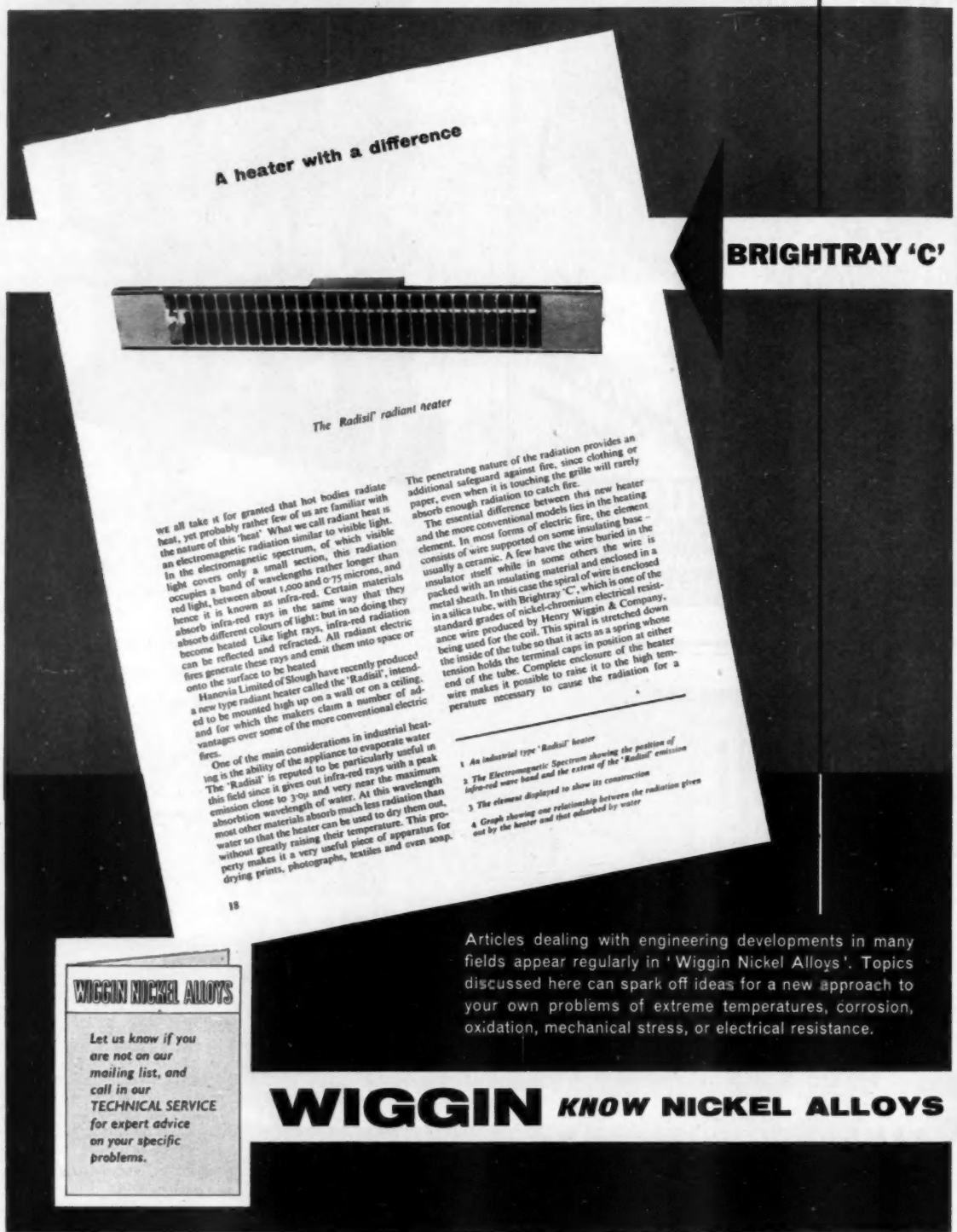
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we all take it for granted that hot bodies radiate heat, yet probably rather few of us are familiar with the nature of this 'heat' What we call radiant heat is an electromagnetic radiation similar to visible light. In the electromagnetic spectrum, of which visible light covers only a small section, this radiation occupies a band of wavelengths rather longer than red light, between about 1,000 and 0·75 microns, and hence it is known as infra-red. Certain materials absorb infra-red rays in the same way that they absorb different colours of light: but in so doing they become heated. Like light rays, infra-red radiation can be reflected and refracted. All radiant electric fires generate these rays and emit them into space or onto the surface to be heated
Hanovia Limited of Slough have recently produced a new type radiant heater called the 'Radisil', intended to be mounted high up on a wall or on a ceiling, and for which the makers claim a number of advantages over some of the more conventional electric fires.
One of the main considerations in industrial heating is the ability of the appliance to evaporate water The 'Radisil' is reputed to be particularly useful in this field since it gives out infra-red rays with a peak emission close to 3·0μ and very near the maximum absorbtion wavelength of water. At this wavelength most other materials absorb much less radiation than water so that the heater can be used to dry them out without greatly raising their temperature. This property makes it a very useful piece of apparatus for drying prints, photographs, textiles and even soap.
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2 The Electromagnetic Spectrum showing the position of infra-red wave band and the extent of the 'Radisil' emission
3 The element displayed to show its construction
4 Graph showing our relationship between the radiation given out by the heater and that absorbed by water
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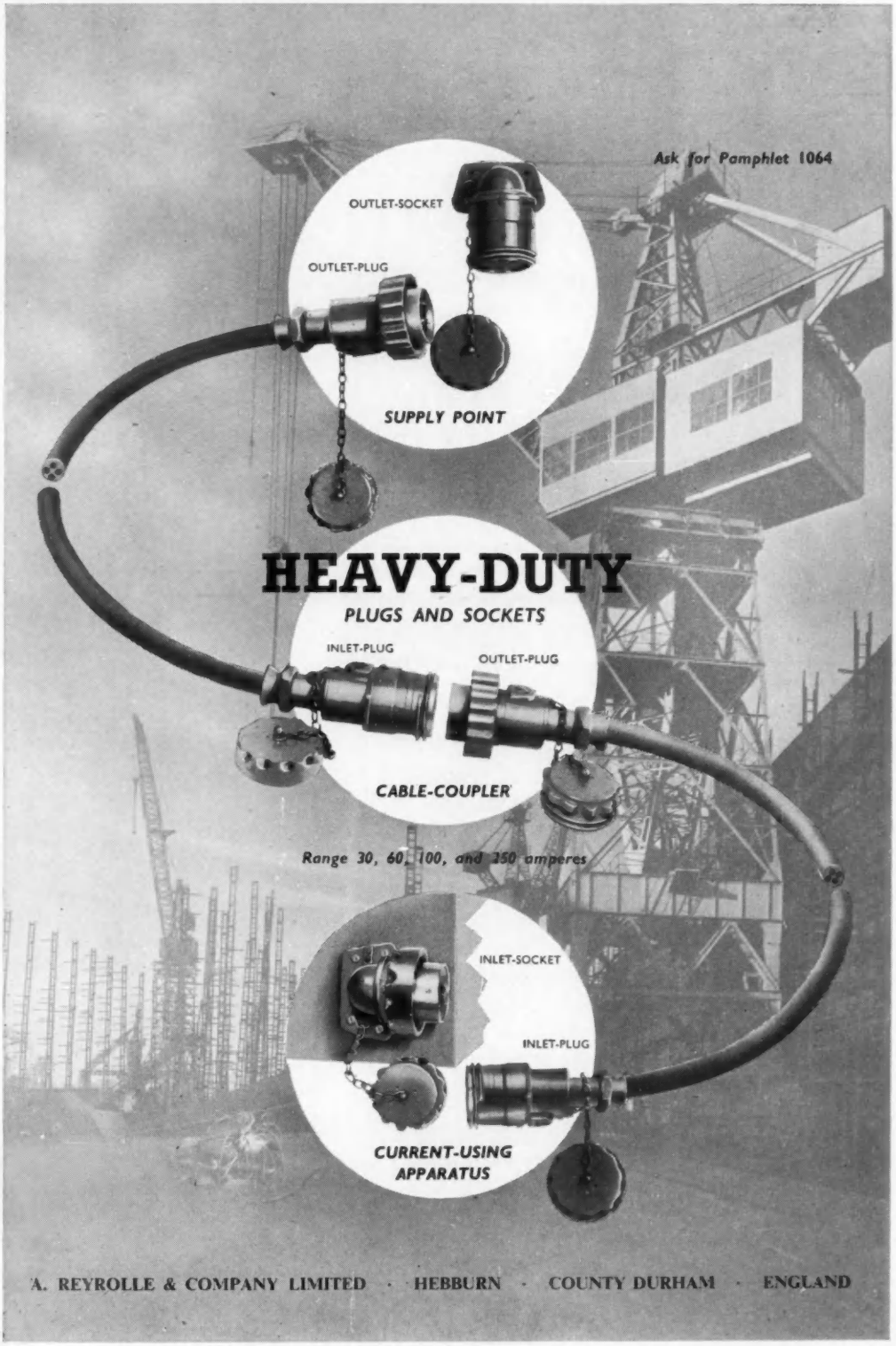
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Estimates given for all types of electrical installations without obligation

EDMUNDSONS CONSTRUCTION CO. LTD.
Electrical Engineers and Contractors
2 Hartley Hill, Leeds 2
Telephone: Leeds 33791

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
44 Bank Street, Sheffield 1
Telephone 24015 (3 lines) *Telegrams: "Wheelect"*

NORTH WESTERN

H. J. CASH & CO. LTD.
28 Chapel Street, Liverpool 3
Telephone: Central 0452
Electrical Engineers and Contractors

STEWART THOMSON & SONS (Liverpool) LTD.
Fort Road, Seaforth, Liverpool 21
Repairs and Rewinds A.C. and D.C. to 3,000 horsepower. Breakdowns, Urgent Repairs, etc. 24-hour service
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DRAKE & GORHAM (Contractors) LTD.
21 Newton Street, Piccadilly, Manchester 1
Telephone: Manchester Central 4701
Electrical Engineers and Contractors

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
Regal Buildings, Oxford Road, Manchester 1
Telephone: Central 8207-8

Industrial Installations
W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.
12 York Street, Manchester 2
Telephone: CENtral 2991-6
Works: Praed Road, Trafford Park, Manchester 17

THE NELSON ENGINEERING CO. LTD.
Telephone: Nelson 1545/6
Electrical and Mechanical Engineers.
Complete Industrial Installations. Rewinds
Netherfield Road, Nelson

NORTH EASTERN

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Electrical Contractors and Manufacturers
Estimates given for all types of electrical installations without obligation

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
52 Elswick Road, Newcastle
Telephone: Newcastle 36271

Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to :

THE
ADVERTISEMENT DEPARTMENT,
ELECTRICAL REVIEW,
DORSET HOUSE, STAMFORD STREET,
LONDON, S.E.1

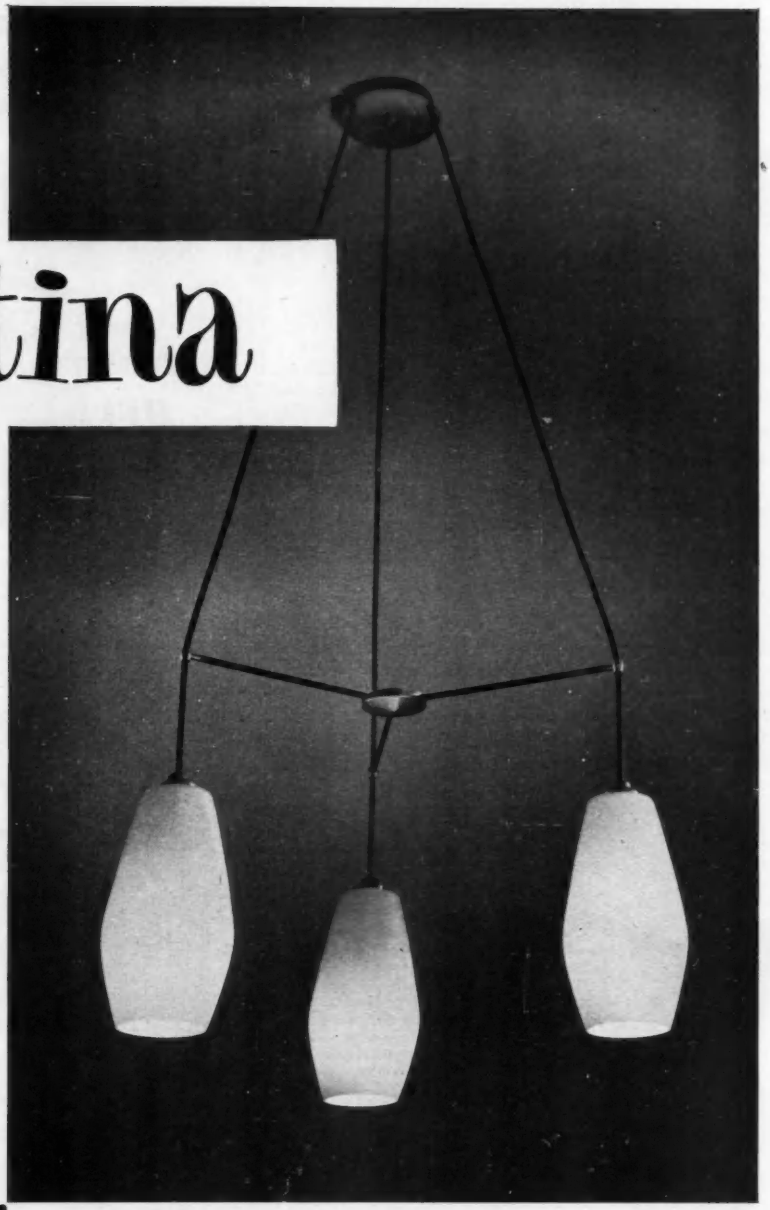
BANNER COIL COMPARATOR

Compares batches of similar Coils with standard coil.

Detects 1% error in number of turns.

THE BANNER ELECTRIC CO. LTD.
HODDESDON, HERTS. *Tel. Hodd 2659*
MAKERS OF GOOD TRANSFORMERS

Satina



Selected by the Council of Industrial Design as the Fitting of the Year to represent the G4005 A.E.I. Satina range

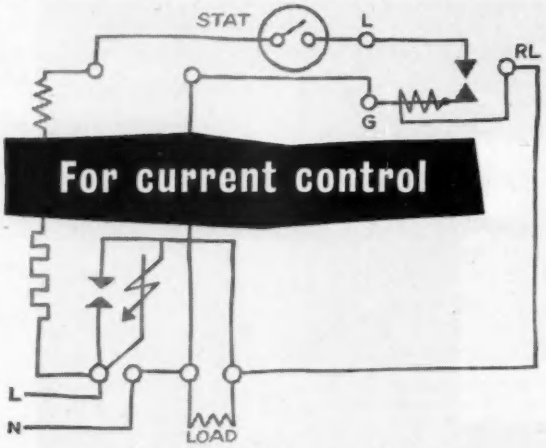
British Design—
British Manufacture

1958 DESIGN CENTRE AWARD

A·E·I
Lamp and Lighting Co Ltd

Publicity Department,
18 Bedford Sq., London, W.C.1

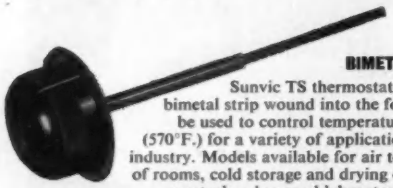
M4766



...SPECIFY SUNVIC

Sunvic components are widely used for controlling equipment such as moulding presses, furnaces, incubators, chemical plant, etc. Together with the Sunvic potentiometric recorder they also have numerous applications in scientific and industrial research particularly for measuring, controlling and recording temperature and small electrical quantities.

If you have a specific problem or would like technical information on any or all Sunvic components, please contact Sunvic Controls Ltd., P.O. Box 1, Harlow, Essex. Tel: Harlow 25271.



ADJUSTABLE BIMETAL THERMOSTATS

Sunvic TS thermostats are operated by a bimetal strip wound into the form of a helix. Can be used to control temperatures of up to 300°C. (570°F.) for a variety of applications in research and industry. Models available for air temperature control of rooms, cold storage and drying chambers, for oven control and general laboratory work, and with a sensitivity of ±1/10°C. for very accurate control.

ENERGY REGULATORS

The Sunvic energy regulator effects its control by periodically switching on and off the power, the ratio of the on-time to the total time determining the average power input, which is continuously variable. Available in several forms with a continuous rating of 1kW at 230V. A.C.; also supplied with an HVS relay for larger loads.

HOTWIRE VACUUM SWITCH (HVS) TUBES AND RELAYS

Available either as a loose tube for switching up to 10 kW at 400V. A.C. or D.C. or as a complete relay either enclosed in a plastic box or mounted on a paxolin base for incorporation in customer's own equipment. For single—or three-phase A.C. applications. Advantages are: no arcing; silent operation; low, non-inductive operating current; A.C. or D.C.; inductive or non-inductive loads.

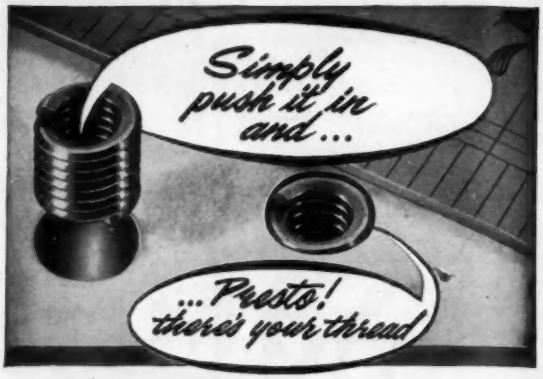
SUNVIC

An A.E.I. Company

Control and research equipment for science and industry

relays, thermostats, time delays, energy regulators, D.C. amplifiers and potentiometric recorders

SC/68



HELI-COIL
REGD. TRADE MARK
PUSH-TYPE INSERTS

THE READY-MADE THREAD FOR MOULDED MATERIALS

Eliminate the need for solid bushing and tapping, use a HELI-COIL PUSH-TYPE INSERT the ready-made screw thread for moulded and plastic parts, die cast alloys, powdered metals, all soft light materials and many hard metals. Pushed directly in drilled cast, or moulded, blind or through holes, this is the ideal low-cost, volume production, fastening method. A few shillings in tooling is all you need for up to 1,200 holes and more per hour.

For faster, cheaper production

Write for details to:

ARMSTRONG PATENTS CO. LTD. BEVERLEY, YORKSHIRE

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For Every Gauge
IN EVERY WIRING INSTALLATION

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REGISTERED TRADE MARK

BRITISH MADE ONE PIECE
PORCELAIN CONNECTORS

MADE BY **V.G. PORCELAIN CO., LTD.**

GORST RD., PARK ROYAL, LONDON, N.W.10. *Telephone:* ELGAR 7362

Distributors: S. O. Bowker Ltd., Gee (Birmingham) Ltd., Birmingham, and Metway Ltd., Brighton

'phone your nearest stockist of BTH ELECTRIC MOTORS for delivery today

BEXHILL 4010	Ford Wholesale Electric Ltd
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COVENTRY 60247	Lee Beesley & Co Ltd
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DERBY 49192	'Z' Electric Lamp & Supplies Co Ltd
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EXETER 75201	W. J. Mathews (Exeter) Ltd
GLASGOW Central 7174	Buck & Hickman Ltd
HORSHAM 2213	Ford Wholesale Electric Ltd
HOVE 71268	Ford Wholesale Electric Ltd
LEICESTER 23457	Perkins & Spencer Ltd
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LEEDS 20834	Green & Smith Ltd
LINCOLN 11337	Penney & Porter Ltd
LONDON Bishopsgate 7676	Buck & Hickman Ltd, E1
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Terminus 3666	British Central Electrical Co Ltd, EC1
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LUTON 2930	Shoolbred Rewinds Ltd
MANCHESTER Ardwick 4351	Buck & Hickman Ltd
MIDDLESBROUGH 2267	C. Horne & Co Ltd
NEWCASTLE-UPON-TYNE 22141	Watson-Norie Ltd
NORTHAMPTON 31401	E.M.F. (Electrical) Ltd
NOTTINGHAM 52838	'Z' Electric Lamp & Supplies Co Ltd
SWANSEA 53917	Newey & Eyre Electrical Co Ltd
TUNBRIDGE WELLS 3003	Ford Wholesale Electric Ltd
WALLSEND-UPON-TYNE 63353	Watson-Norie Ltd
WOLVERHAMPTON 26354	The Midland Electric Installation Co Ltd

B T-H

For technical advisory service on electric drives consult your nearest BTH District Office :— Belfast, Birmingham, Bristol, Cambridge, Cardiff, Dublin, Glasgow, Leeds, Liverpool, London, Manchester, Middlesbrough, Newcastle-upon-Tyne, Nottingham, Sheffield, Swansea.

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND

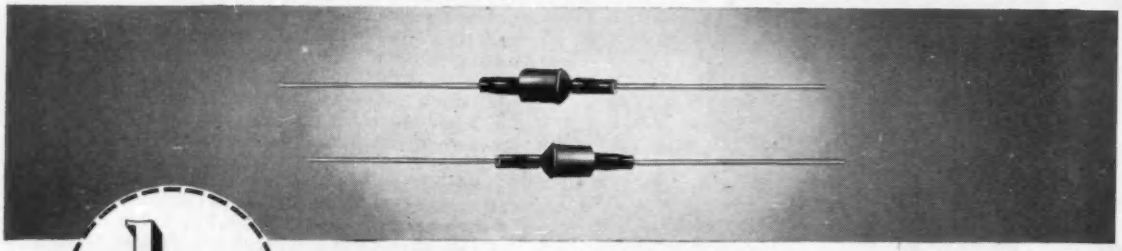
an A.E.I. Company

A 5273

SenTerCel

LOW POWER SILICON RECTIFIERS

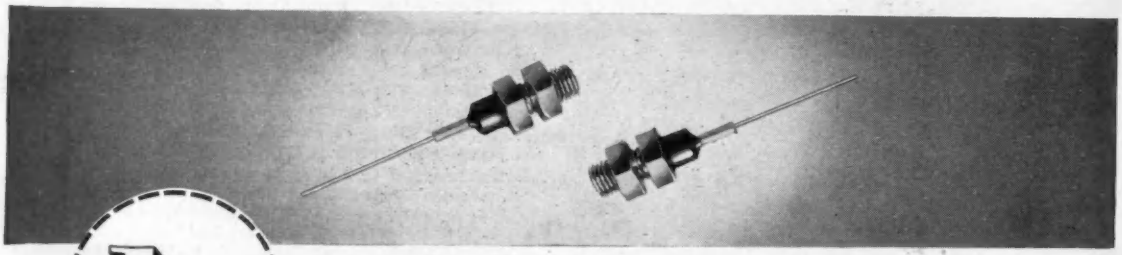
High Efficiency · High Temperature Operation
Small Size · Hermetically Sealed



½ AMP

Mean D.C. at 35°C	⅓ amp halfwave 1 amp fullwave 1½ amps three phase	**Peak Inverse Voltage in six grades (−40°C to +100°C)**	RS20A — 50V RS21A — 100V RS22A — 150V RS23A — 200V RS24A — 300V RS25A — 400V
Mean D.C. at 100°C	50% of above		

(WRITE FOR TECHNICAL DATA SHEET FJSIL 101)



1 AMP

Mean D.C. at 35°C (With 2 sq. in. cooling fin)	1 amp halfwave 2 amps fullwave 2½ amps three phase	**Peak Inverse Voltage in six grades (−40°C to +100°C)**	RS30A — 50V RS31A — 100V RS32A — 150V RS33A — 200V RS34A — 300V RS35A — 400V
Mean D.C. at 100°C (With appropriate cooling fin)	40% to 100% of above		

(WRITE FOR TECHNICAL DATA SHEET FJSIL 102)

... available from production

Hyperpure silicon used in the manufacture of **SenTerCel** *silicon rectifiers has been developed and produced by STC in this country to avoid dependence on imported supplies.*

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, London, W.C.2

RECTIFIER DIVISION: EDINBURGH WAY · HARLOW · ESSEX

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

OFFICIAL NOTICES, TENDERS, ETC.

LEEDS REGIONAL HOSPITAL BOARD

To Electrical Contractors

TENDERS are invited for carrying out the Electrical Installation required in the Reorganisation of the Main Block at Stanley Royd Hospital, Wakefield.

Applications for form of tender and specification and drawings, accompanied by a deposit of £2 2s. (which will be refunded on receipt of a bona fide tender and other contract documents), must be made to the Architect to the Board at the undermentioned address not later than 12 noon on Tuesday, 20th May, 1958. Cheques should be made payable to the "Leeds Regional Hospital Board" and crossed.

A copy of the drawings, conditions of tender and conditions of contract may be inspected at the office of Messrs. Ernest Griffiths & Son, Consultant Engineers, Kinders, Bromborough, Cheshire.

Sealed tenders, in the endorsed envelope provided, must be delivered to the undersigned not later than 12 noon on 12th June, 1958.

The Board does not bind itself to accept the lowest or any tender.

WM. A. SHEE,
Secretary to the Board.

Park Parade,
Harrogate, Yorks. 3399

SELBY URBAN DISTRICT COUNCIL

Street Lighting—Group B

TENDERS are invited for the supply of the following Street Lighting Equipment:—

(a) Supply of 110 60-watt Sodium Lanterns and auxiliary equipment, including wall brackets, etc.

(b) Supply of 75 Concrete Street Lighting Columns.

Each of the above items will be subject of a separate tender and applications for bills of quantities, specifications, etc., indicating for which it is proposed to tender should be made to the undersigned.

Sealed tenders endorsed "Street Lighting, ——," to be delivered to W. H. Spashett, Clerk to the Council, 12, Park Street, Selby, by 12 noon on Monday, 9th June, 1958.

The Council do not bind themselves to accept the lowest or any tender.

H. E. PHILLIPS, M.I.Mun.E.,
Engineer and Surveyor.

Council Offices,
12, Park Street, Selby.
9th May, 1958. 3458

MIDLOTHIAN COUNTY COUNCIL

TENDERS are invited for supply and erection of 250 80-watt Mercury Fluorescent Lamps on 15-ft. Steel Columns (with alternative for Concrete Columns) at Newtongrange, Easthouses-Gowkshill.

Specifications, bill of quantities and form of tender may be obtained from, and a copy of the plan seen at, the office of the County Surveyor, 32, Palmerston Place, Edinburgh, 12.

Sealed offers, marked "Street Lighting, Newtongrange-Easthouses-Gowkshill," should be lodged with the County Clerk, County Buildings, George IV Bridge, Edinburgh, by 20th June, 1958. 3457

CLASSIFIED ADVERTISEMENTS ARE PREPAID

SITUATIONS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of I.E.E. or I.Mech.E. for post (a) and Corporate Membership for post (b) an advantage.

(a) ASSISTANT TO APPRENTICES' TRAINING OFFICER, BANKSIDE TRAINING SCHOOL, SOUTHWARK, LONDON, S.E.1 (Vacancy No. 58/329).

The above vacancy has arisen due to promotion. Duties will include instruction in the use of machine tools, and the successful candidate should hold the Final C. and G. Certificate in Machine Shop Engineering. Teaching experience and ability to assist on benchwork and in blacksmithing and welding would be an advantage. Salary Class AX/EX, Grade 8 = £750 to £985 p.a.

NOTE: This advertisement is in substitution for Vacancy 58/291, which is hereby cancelled. Any application already received will be considered for Vacancy 58/329.

(b) DEPUTY POWER STATION SUPERINTENDENT, BRUNSWICK WHARF POWER STATION (Vacancy No. 58/330).

Candidates should have had sound technical training in mechanical and electrical engineering followed by experience in operation, maintenance and administration of a modern generating station, together with a successful record in labour relations. Salary Class K, Grade 3 = £1,620 p.a.

Applications, quoting vacancy number to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 26th May, 1958. 3422

CENTRAL ELECTRICITY GENERATING BOARD

North West, Merseyside and North Wales Region

GENERATION Operation Department at Regional Headquarters, Manchester, has vacancies for:—

(a) METALLURGIST responsible for investigating and giving advice on metallurgical problems associated with boiler, turbine and ancillary plant. Candidates should preferably hold a Degree in Metallurgy or A.I.M., have a sound background of industrial metallurgy and metallography, also some experience of welding. Salary within scale £1,145/£1,410. Vacancy No. E.200/192/A.

(b) ASSISTANT METALLURGIST, with knowledge of industrial metallurgy, metallography, and some experience of welding, to assist in investigations on metallurgical problems associated with boiler, turbine and ancillary plant. Candidates should preferably be Licentiates of the Institute of Metallurgy. Salary within scale £710/£935. Vacancy No. E.200/193/A.

Both appointments superannuable. Sick pay and holiday schemes.

Applications, quoting vacancy number and giving full details of education, experience and stating age, should be sent to the Director of Labour and Welfare, Central Electricity House, 825, Wilmslow Road, Manchester, 20, not later than 10th June, 1958. 3438

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

WHITSUN

Classified Advertisements for the issue of 30th May should reach us by FIRST POST on FRIDAY, 23rd May

SOUTHERN ELECTRICITY BOARD

Installation Engineer

Oxford District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class H, Grade 7 (£995 × £20 to £1,055 per annum). N.J.B. conditions of service.

Applicants should be qualified to accept responsibility for all installation and maintenance work in the district and its branch, and to collaborate with the Development Engineer and District Commercial Engineer in the preparation of estimates for contracting work, particularly those of an exceptional nature. The duties will also extend to branches.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, and returned to him, quoting reference Z.906, not later than 27th May, 1958.

Assistant Engineer (Planning)

Basingstoke District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class E, Grade 10 (£685 × £15 to £730 per annum). N.J.B. conditions of service.

The successful candidate will be required to assist the Planning Engineer in the preparation of schemes and estimates for extension of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should have had sound experience in electricity supply distribution and the possession of suitable technical qualifications would be an advantage.

The successful candidate will be required to carry out standby duties if and when called upon to do so.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him, quoting reference Z.905, not later than 27th May, 1958.

The successful candidates will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 3466

ELECTRICAL ENGINEER

SAUNDERS-ROE Limited urgently require an ELECTRICAL ENGINEER, preferably with a suitable degree or H.N.C., for interesting design work in connection with aircraft electrical installations.

Applicants are invited to send particulars of age, experience, qualifications, etc., to the Personnel Officer, Saunders-Roe Limited, East Cowes, Isle of Wight (Ref. ER/02 should be quoted).

3465

COUNTY OF LANARK

ASSISTANT ELECTRICAL ENGINEER required for County Architect's Department, Motherwell. Salary scale A. and P., Grade VI (£865/£935). Should hold H.N. Certificate and be experienced in design of electrical schemes for schools, etc.

Medical examination. Superannuation. No canvassing.

Applications, stating age, qualifications and experience, with names of three referees, to be lodged with County Clerk, P.O. Box 1, Glasgow, within two weeks of date of advertisement. 3417

***Situations Vacant** (continued)*

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

SHIFT CHARGE ENGINEER,
COVENTRY POWER STATION
(Vacancy No. 74/58/ER).

Applicants should have had a sound technical training and practical experience in the operation of steam generating plant and main switchgear. An apprenticeship and technical qualifications would be an advantage.

Salary will be in accordance with Class G, Grade 7 (£935-£995 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 21st May, 1958.

SHIFT CONTROL ENGINEER,
LINCOLN POWER STATION
(Vacancy No. 75/78/ER).

Applicants should have had a sound training and practical experience in a modern power station. The possession of a Higher National Certificate in Electrical Engineering, or its equivalent, would be advantageous.

The salary will be in accordance with Class F, Grade 10 (£740-£785 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 21st May, 1958.

DEPUTY STATION SUPERINTENDENT,
COVENTRY POWER STATION
(Vacancy No. 77/58/ER).

Applicants should be suitably qualified engineers, have had a sound general education and technical knowledge in mechanical and electrical engineering, and good experience in the operation and maintenance of steam generating plant.

Salary will be in accordance with Class G, Grade 3 (£1,235-£1,325 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 30th May, 1958.

GENERAL ASSISTANT ENGINEER,
AVON POWER STATION, WARWICK
(Vacancy No. 78/58/ER).

A General Assistant Engineer is required at Avon Power Station, Warwick, where the suitable applicant will be given the opportunity to obtain operating and maintenance experience at this power station.

Applicants should be in possession of suitable engineering qualifications.

Salary will be within the range £540-£635 per annum in accordance with the National Joint Board Agreement.

Closing date for receipt of applications, 28th May, 1958.

SECOND ASSISTANT ENGINEER
(Electrical),
GENERATION (Construction) DEPT.
DIVISIONAL HEADQUARTERS
(Vacancy No. 79/58/ER).

Preference will be given to applicants who hold a degree in Electrical Engineering, are Corporate Members of the Institution of Electrical Engineers, or possess other equivalent qualifications.

They should have had experience in the design and installation of switchgear, transformers and cables up to 33 kV, and other electrical equipment associated with modern power stations.

Experience in the preparation of specifications and estimates and preparing reports on tenders will be a recommendation.

Salary will be within Class AX/EX, Grade 4 (£1,145-£1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28th May, 1958.

SHIFT CHARGE ENGINEER,
CASTLE DONINGTON
POWER STATION
(Vacancy No. 80/58/ER).

Applicants should have had operating experience with high-pressure turbo-alternators and pulverised fuel-fired boilers.

Possession of technical qualifications admitting to Corporate Membership of the Institution of Mechanical and/or Electrical Engineers and also proof of indentured apprenticeship will be an advantage.

Salary will be in accordance with Class L, Grade 7 (£1,235-£1,325 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 28th May, 1958.

These appointments will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

7th May, 1958. 3423

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts :—

North Staffs. Sub-Area

GENERAL ASSISTANT DISTRICT ENGINEER (Stoke South District). Applicants will be required to assist, and should have had experience, in the planning, construction and maintenance of H.V. and L.V. overhead and underground mains. Technical qualifications desirable. Salary £685/£730 per annum (N.J.B. Grade F.11). (It is anticipated that the District classification will be raised to "G" from 1st April, 1958).

Apply by letter, within 14 days, stating age, experience, present salary and position to Mr. H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, 234, Victoria Road, Fenton, Stoke-on-Trent.

Shropshire and Herefordshire Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Leominster District). Duties involve the construction, maintenance and operation of E.H.V. and L.V. mains and substations and planning system reinforcements and mains extensions. Technical qualifications desirable. Salary £790/£835 per annum (N.J.B. Grade D.).

DEMONSTRATOR (Female) (Hereford District). Applicants must have had a good education and should have a certificate of a recognised domestic training college and/or the E.A.W. Certificate. Duties include lecture demonstrations in service centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus. Salary £500/£600 per annum (N.J.C. Grade 1).

Apply by letter, within 14 days, stating age, education, training, experience, present salary and position to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

Wolverhampton and District Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Cannock District). Applicants should be technically qualified to at least H.N.C. standard, and should have experience in the construction, operation and maintenance of distribution systems. Duties will be mainly concerned with planning system reinforcements and mains extensions; and calculations and testing associated with protective gear. Salary £835/£880 per annum (N.J.B. Class E, Grade 7).

Apply by letter, within 14 days, stating age, experience, present position and salary to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 83 Darlington Street, Wolverhampton.

A. STEPHENS,
Secretary. 3463

ELECTRICAL ENGINEER

A LEADING firm of electrical contractors mainly engaged in heavy industrial power and lighting contracts require GENERAL MANAGER for Branch Office.

This is a new appointment offering considerable scope, and applicants for this post must have sound commercial and practical experience in the contracting field and be capable of obtaining, handling and successfully completing contracts of large magnitude.

Candidates being Corporate Members of I.E.E. or holding an engineering degree will be preferred.

Basic salary £1,750 per annum, rising to £2,500 by means of commission on profits.—Box 3482.

ELECTRICITY CORPORATION OF NIGERIA

APPLICATIONS are invited for the following appointments:—

SENIOR EXECUTIVE ENGINEERS

The duties of these appointments will consist mainly of the executive control and management of districts comprising a number of electricity undertakings with mainly overhead distribution networks and diesel engined power stations.

An intensive development programme is at present in progress, and in addition to wide experience in the above duties, applicants should also be capable of supervising construction of transmission lines up to 132 kV, and power station extensions.

Candidates must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications and should not be over 45 years of age.

Salary in scale £1,500-£1,740, plus Inducement Addition of £300, according to qualifications and experience.

ELECTRICAL ENGINEERS, GRADE I

Experience in the design, construction and operation of overhead distribution networks up to 33 kV essential. 132 kV transmission line experience desirable.

Candidates will be expected to take charge of small undertakings with steam or diesel power stations and must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Salary in scale £1,125-£1,449 with Inducement Addition of £270-£300, according to qualifications and experience.

ELECTRICAL ENGINEERS, GRADES II & III (Overhead Mains)

Applicants must have had a sound technical training and long experience in the erection and maintenance of overhead lines and substations up to 33 kV.

Salary in scale £930-£1,074; £1,110-£1,128 with Inducement Addition of £240-£270, according to experience.

POWER STATION CHEMIST

Applicants should have a minimum educational qualification of Higher National Certificate, and also have had practical experience of fuel, oil and water testing as applied to modern power stations. A knowledge of water treatment for medium and high pressure steam plant is also essential.

Salary in scale £1,125-£1,341 plus Inducement Addition of £270-£300, according to qualifications and experience.

The above appointments will be on contract terms of one or two tours of not less than 18 months continuous service each. The posts carry an additional contract allowance of 10 per cent of the basic salary and a lump sum gratuity of 25 per cent of the total emoluments (excluding contract allowance) at the conclusion of the contract. An outfit allowance of £60 is payable on appointment.

First class passages are provided with special passage arrangements and allowances for the officer's wife and up to two children.

Quarters with hard furnishings will be provided at a low rental.

Further particulars and application forms may be obtained on request from the Electricity Corporation of Nigeria, Nigeria House, 9, Northumberland Avenue, London, W.C.2.

Completed application forms should be returned not later than 15th June, 1958.

This is an amended advertisement and previous applicants need not submit fresh applications.

3480

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area
CASTLEFORD DISTRICT
DISTRICT COMMERCIAL ENGINEER.

Applicants must be conversant with all matters connected with the commercial organisation of a district mainly industrial, and be experienced in the control of staff. They must have experience in negotiations with large power consumers in development work, contracting, service centre organisation, street lighting, the preparation of statistics and reports and in general management.

Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers. The successful applicant will be required to live in the Castleford district.

Salary N.J.B. Class F, Grade 4, £1,065/£25/£1,140 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 30th May, 1958.

No. 6 (Hull) Sub-Area
HULL DISTRICT
SECOND ASSISTANT DISTRICT ENGINEER.

Applicants should have had a sound practical training and experience in the design, construction. operation and maintenance of H.V. and M.V. overhead and underground distribution systems, substation plant and ancillary equipment in extensive industrial and city networks, including changeover D.C. to A.C.

Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications.

Candidates must be prepared to reside in Hull and undertake standby duties.

Salary N.J.B. Class J, Grade 7, £1,065/£25/£1,140 per annum.

THIRD ASSISTANT DISTRICT ENGINEER.

The successful candidate will be responsible for the operation and maintenance of the 22-kV, 11-kV and 6.6-kV networks in the district and should be capable of carrying out network loading and fault power calculations, and in particular to organise the routine overhaul of switchgear and ancillary plant.

Preference will be given to applicants who are Graduate Members of the Institution of Electrical Engineers or possess equivalent qualifications.

Candidates must be prepared to reside in Hull and undertake standby duties.

Salary N.J.B. Class J, Grade 9, £935/£20/£995 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 30th May,. 1958. 3472

ESSEX EDUCATION COMMITTEE

West Essex College of Further Education
College Gate, The High, Harlow

APPLICATIONS are invited from suitably qualified persons for the following full-time teaching appointment:—

ASSISTANT GRADE B or A in City and Guilds Electrical Installation Work.

The successful applicant will be encouraged to take charge of and develop the work in his own subject, and to be responsible for the organisation of the workshop. The appointment will date from either the 1st August or 1st September, 1958. The grading of the post will be decided on the qualifications and experience of the successful candidate.

HOUSING ACCOMMODATION is available in the new town.

The salary will be in accordance with the Burnham Further Education Report, 1956, namely:—

Grade B, £650 by £25 to £1,025; Grade A, £475 by £25 to £900, with additions to the scales for degree (or equivalent) and approved training; increments within the scales for previous teaching service, approved industrial experience and War/National Service.

Details and forms (stamped addressed foolscap envelope) obtainable from the College Clerk, to whom they must be returned within ten days of the publication of this advertisement. 3462

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Woking District.

Salary £885 to £930 per annum under N.J.B. Class F, Grade 7. Superannuable.

Applicants who should have had a good general education and be technically trained up to H.N.C. standard, must have had practical training and experience in general distribution work on systems up to 11 kV, and be capable of organising and supervising the work of a full construction and maintenance programme. Ability to plan and prepare schemes for mains extensions would be an advantage.

Applications received in response to the advertising of this appointment in March will be considered and should not be resubmitted.

Applications, naming two referees, on forms from E. Peel, A.M.I.E.E., Woking Manager, SEEBOARD, 4, Chobham Road, Woking, by 28th May, 1958.

CARTOGRAPHIC DRAUGHTSMAN, Woking District.

Salary £200-£565 per annum according to age and experience. Superannuable.

Applicants should have a sound general education and experience of general drawing office routine.

Applications received in response to the advertising of this appointment in March will be considered and should not be resubmitted.

Application, naming two referees, on forms from E. Peel, A.M.I.E.E., Woking Manager, SEEBOARD, 4, Chobham Road, Woking, by 28th May, 1958.

SENIOR COMMERCIAL ASSISTANT, Brighton and Hove District.

Salary £690 × £20 to £750 per annum, under N.J.C. Grade 3. Superannuable.

Applicants of good general education should be fully experienced and able to give advice on all supply matters including the advantageous application of the Board's tariffs, the sales of domestic appliances and the preparation of quotations for domestic, commercial and industrial electrical installations. A knowledge of the basic principles of efficient space heating would be an advantage.

Applications, naming two referees, to P. S. Watson, M.I.E.E., A.M.B.I.M., District Manager, SEEBOARD, Electric House, Castle Square, Brighton, by 28th May, 1958

FIRST ASSISTANT DISTRICT ENGINEER, Tunbridge Wells District.

Salary £995-£1,055 per annum under N.J.B. Class F, Grade 5. Superannuable.

Applicants, preferably Corporate Members of the I.E.E. should have had considerable experience in electricity distribution work covering the planning, construction, operation and maintenance of H.V. and L.V. systems serving some 46,000 consumers.

Applications, naming 2 referees, to T. W. Dann, M.Eng., M.I.E.E., Tunbridge Wells Manager, SEEBOARD, Town Hall, Tunbridge Wells, Kent, by 28th May, 1958.

GEORGE WRAY,
Secretary.
3479

JOSEPH LUCAS
(ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

MIDDLESEX COUNTY COUNCIL

Education Committee

ENFIELD TECHNICAL COLLEGE
Queensway, Enfield, Middlesex

REQUIRED for 1st September, 1958:—

(1) LECTURERS in ELECTRICAL ENGINEERING (2), to teach Electrical Engineering subjects to Higher National Diploma and Institution of Electrical Engineers Part III standard. The ability to offer Electronics and/or Electrical Measurements will be an added recommendation.

Candidates should be University Graduates in Engineering, with teaching and/or industrial experience. Corporate Membership of the Institution of Electrical Engineers is desirable.

(2) ASSISTANT GRADE B, to teach TELECOMMUNICATIONS and RADIO SERVICING in City and Guilds of London Institute courses.

Candidates should be suitably qualified and have had adequate practical experience in these subjects.

Salary in accordance with the Burnham (Technical) Report, 1956, i.e.: Lecturers £1,200 × £30 to £1,350 plus London allowance; Assistant Grade B, £650 × £25 to £1,025 plus London allowance and other additions for previous experience as appropriate.

Application forms (stamped addressed foolscap envelope) from the Principal, to whom completed forms should be returned within 14 days of the appearance of this advertisement.

C. E. GURR, M.Sc., Ph.D.,
Secretary to the
Education Committee.
3436

ELECTRONIC ENGINEERS FOR CANADA

APPLICATIONS from suitably qualified personnel are invited by a leading Canadian Electronics Company for work in Northern Canada.

The duties will comprise installation, instructional, representative and maintenance functions in one of the following:—

(a) Radar (Heavy Ground).
(b) Radio Communications, LF, HF, VHF, UHF.
(c) VH Telegraphy, Carrier Telephony, Multiplex, Microwave and Radio Relay Systems.
(d) Test Equipment.
(e) General Electronics.

Applicants should be in possession of either Engineering Degree, Higher National Certificate, Final City and Guilds, or equivalent qualification, with allied experience.

Apply, stating qualifications and experience, to Box ER4013, L.P.E., Romano House, 399/401, Strand, London, W.C.2.

3426

METROPOLITAN BOROUGH OF BATTERSEA

APPLICATIONS are invited for the permanent appointment of ASSISTANT ENGINEER, A.P.T. Grade III (£845 to £1,025 per annum, plus London weighting, £30 per annum age 26 and over). The commencing salary will be related to experience and to any professional qualifications held.

The successful applicant will be engaged on general mechanical and electrical work.

The appointment is subject to the Local Government Superannuation Acts, 1937-53.

Further particulars and forms of application obtainable from the Borough Engineer and Surveyor, Town Hall, London, S.W.11. Closing date, 9th June. 3475

Situations Vacant (continued)

COUNTY BOROUGH OF CROYDON EDUCATION COMMITTEE

Croydon Technical College, Fairfield, Croydon
Principal: H. Falkner, M.Sc.(Wales), B.Sc.(Lond.), A.Inst. P.

APPLICATIONS are invited for the following posts in the Electrical Engineering Department:—

1. LECTURER
(Lecturer Grade £1,200-£1,350 p.a.).
Candidates should be qualified to teach Electrical Engineering (Power) to Higher National Certificate standard. Some knowledge of servo-mechanisms and industrial electronics will be an advantage.
Duties to commence as soon as possible.

2. ASSISTANT, Grade B.
Candidates should be qualified to teach Electrical Engineering Science and Mathematics to the Ordinary National Certificate standard. Ability to offer one or more of the following will be an advantage: Engineering Drawing, Mechanical Engineering Science, Regulations and Installation Technology (Course B), and Workshop Practice of the Electrical Technicians' Course.
Duties to commence on 1st September, 1958.
Salaries in accordance with Burnham Technical Scale (London area).
Further particulars and form of application may be obtained from the undersigned on receipt of a stamped addressed envelope, and completed forms should be returned to the Principal within 21 days of the appearance of this advertisement.

R. WEARING KING,
Chief Education Officer.

Education Office,
Katharine Street, Croydon. 3437

WARWICKSHIRE EDUCATION COMMITTEE

THE Governing Body of the College invites applications for the following new posts, for service in that portion of the College dealing with full-time industry based sandwich courses only. These are progressive posts in a rapidly developing College with an expanding programme of advanced courses in engineering technology and an assured recruitment of industry based students. Unusual opportunities exist for the promotion of industrial contacts and research activities.

(1) SENIOR LECTURER IN ELECTRICAL ENGINEERING.
Applicants should have a university degree, professional qualifications, teaching experience, and a particular interest in the subject of Electrical Machines or Control Systems.
This is a special post carrying, with Ministry of Education consent, a scale maximum which is £150 in excess of the Burnham agreed salary of £1,350 × £50 to £1,550.

(2) LECTURESHIPS (three) IN ELECTRICAL ENGINEERING.
Applicants should have a university degree and appropriate teaching and/or industrial experience.
Salary scale in accordance with the Burnham Technical Report for Lecturers, £1,200 × £30 to £1,350.
Further particulars and application forms may be obtained from the Principal, to whom replies should be addressed as soon as possible.

W. COOPER,
Principal.

Rugby College of Technology and Arts,
Eastlands, Rugby. 3467

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

ASSISTANT SHIFT CHARGE ENGINEER required at Portishead "B" Power Station. Superannuation scheme. Salary N.J.B. Class K, Grade 9, £995-£1,055 plus 10% shift allowance.
Applicants should possess good technical qualifications and have had training and experience in the control and operation of steam generating plant and main switchgear.
Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Rd., Bristol, 8, should be completed and returned by 21st May, 1958. 3459

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

APPLICATIONS are invited for the following position:—
GRADE 10 ENGINEER,
PORTSMOUTH GENERATING STATION (S/13.1002).
Applicants should have had appropriate experience in a modern generating station, and manufacturing works experience will be an advantage. The successful candidates may be required to undertake shift operational duties. Candidates should possess H.N.C. or equivalent, and preferably possess or be studying for qualifications leading to corporate membership of an appropriate professional institution. This position will afford valuable experience in all aspects of the operation of a generating station.
Salary N.J.B. Class G, Grade 10, £790-£835 plus 10% when on shift.
Special application forms obtainable only from P. D. A. Oliver, Divisional Secretary, Central Electricity House, High Street, Portsmouth, should be returned by the 28th May, 1958. 3460

FERRANTI LIMITED

has a vacancy

for an

ELECTRICAL ENGINEER
OR PHYSICIST

to be concerned with

ACOUSTICAL PROBLEMS

arising in development work on power transformers.

Candidates should preferably possess a degree in Physics or Electrical Engineering, and some previous experience of experimental work in the field of acoustics would be an advantage. The vacancy offers the opportunity of most interesting work with individual responsibility.

The company has a staff pension scheme and an insurance scheme for dependants.

Application forms can be obtained from T. J. Lunt, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote ref. F.W.G.

3429

RAILWAY MODERNISATION

ELECTRICAL ENGINEER required to take part in an extensive programme of development of electrical equipment arising from the railway modernisation programme. Work in hand involves the design of D.C. relays, solenoids and electro-pneumatic valves, actuators, switching circuits, etc. Appointment in the West London area.
Applications to—Box 3409.

SOUTH EASTERN ELECTRICITY BOARD

SUB-AREA COMMERCIAL OFFICER, Surrey Sub-Area, Dorking, Surrey.
Salary £1,900-£2,100 in accordance with N.J.M. Class C, Grade 5. Candidates should preferably be Corporate Members of the Institution of Electrical Engineers and must have had a wide experience of commercial work in both urban and rural areas.
Application forms, together with some information about the Surrey Sub-Area, may be obtained from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBOARD, Rough Rew, Ridgeway Road, Dorking, Surrey. Applications to be submitted by 28th May, 1958.

GEORGE WRAY,
Secretary.

3478

CITY AND COUNTY OF BRISTOL

Education Committee

COLLEGE OF TECHNOLOGY

APPLICATIONS invited for following full-time posts in Department of ELECTRICAL ENGINEERING, 1st September:—

1. SENIOR LECTURER, with bias towards heavy current subjects.
2. LECTURER, with bias towards heavy current subjects.
3. ASSISTANT LECTURER GRADE B for work of Ordinary National Certificate standard.

Salary, Burnham Technical Scale:—

Senior Lecturer	£1,350 × £50 to £1,550
Lecturer	£1,200 × £30 to £1,350
Grade B	£650 × £25 to £1,025

Increments within scales will be given for approved industrial experience.
Details and application form from Registrar, College of Technology, Ashley Down, Bristol, 7. 3424

POWER SYSTEMS

SENIOR AND JUNIOR RELAY APPLICATION ENGINEERS

'ENGLISH ELECTRIC'
STAFFORD

THE company is interested in appointing a Senior and a Junior Engineer with experience in power systems relay application, testing and commissioning.

Applicants should have a good degree or equivalent qualification in electrical engineering.

The senior appointment will be to the monthly staff and after one year's service carries three weeks' holiday. Both openings are pensionable after a qualifying service.

Careful consideration will be given to the housing requirements of the successful candidates.

Write giving full details to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. ER.1212L.

3322

IGRANIC ELECTRIC CO. LTD. BEDFORD

announce the following vacancies in an expanding Contracts Department:

DESIGN ENGINEERS
ESTIMATING ENGINEERS

Applicants must be trained to at least H.N.C. level, and preferably experienced in the field of automatic motor control.
Several young men of O.N.C. level and suitable background would also be considered for training.

DRAUGHTSMEN

Experience in light engineering essential. Electrical knowledge an added advantage.

Apply in confidence with full particulars to the—

Personnel Officer

3440

AN EXCELLENT OPPORTUNITY

exists for an ENGINEER experienced with winding rotating and static electrical machinery who has drive and initiative.
The post involves direct supervision of labour and development of work methods.
The salary will be in accordance with qualifications.
The works concerned is in the Midlands.
Detailed applications to—Box 3371.

MIDDLESEX COUNTY COUNCIL
Education Committee

BRUNEL COLLEGE OF TECHNOLOGY
Woodlands Avenue, Acton, London, W.3

APPLICATIONS are invited for the post of LECTURER in ELECTRICAL ENGINEERING.

Candidates should be graduates with teaching or industrial and research experience.

The department provides courses leading to the Diploma in Technology, B.Sc.(Engineering) and Higher National Certificate. Opportunities will be provided for research work to be carried out by members of the staff.

Salary in accordance with the Burnham (Technical) Report, 1956, i.e. £1,200 × £30 to £1,350, plus London allowance.

Application forms and further particulars (stamped addressed foolscap envelope) from the Principal to whom completed forms should be returned within 14 days of the appearance of this advertisement.

C. E. GURR, M.Sc., Ph.D.,
Clerk to the Governing Body.

3468

SINGAPORE CITY COUNCIL
Pasir Panjang Power Station

APPLICATIONS are urgently invited for the appointment on agreement of a RESIDENT ENGINEER to supervise the final stages of installation of plant and its commissioning in the new Pasir Panjang Power Station, Singapore. The plant still under construction consists of one 25-MW turbo-alternator set, two 187,500-lb./hr. boilers for 600 lb./sq. in., 840° F. steam conditions, and 22-kV and 400-v. switchgear and cables.

Applicants should have had previous experience as a Resident Engineer in charge of power station construction, including civil, electrical and mechanical work.

The salary of the post is $ Malayan 2,650 per mensem, with accommodation and heavy furniture provided by the Council at a rental of $80 per mensem. The duration of the appointment will be six months with an option on the part of the City Council to extend it up to a further period of six months.

The successful applicant will be required to proceed to Singapore by air not later than the end of June. First class passages up to a maximum of three will be provided on commencement and termination of engagement.

Applications, giving full details of experience, should be submitted in duplicate before the 31st May, 1958, to PREECE, CARDEW & RIDER, 8, 10 and 12, Queen Anne's Gate, Westminster, London, S.W.1.

3495

YOUNG MAN
required for Contracts Department

of an old-established Engineering Firm handling Railway Equipment, including Lighting and Heating.

The duties will be compilation of estimates and preparation of tenders for submission to railways and carriage builders throughout the world.

Applicants should preferably have had practical experience in electrical work and should have reached at least Ordinary National Certificate standards.

Please write:

Box 2VP 8339, A.K. Advg., 212a, Shaftesbury Avenue, London, W.C.2.

3278

SOUTH WESTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER, PLYMOUTH. Salary N.J.B. Class G, Grade 5, £1,065 × £25 to £1,140 per annum.

The successful candidate will be responsible to the district commercial engineer for the outside and inside sales organisation, covering two service centres, an outside sales force of 19, an industrial sales department, and the demonstration section.

Candidates should have wide knowledge and considerable experience of all the above aspects of the commercial organisation of a large district. Corporate Membership of the Institution of Electrical Engineers or an equivalent qualification is desirable.

Applications to be made on standard application form A.E.6/ACT. Requests for application forms should be made on a postcard addressed to the District Manager, South Western Electricity Board, Armada Street, Plymouth. Closing date for receipt of completed applications is 31st May, 1958. 3477

CHIEF DRAUGHTSMAN
MOTOR CONTROL GEAR

ESTABLISHED and expanding firm of control gear manufacturers invite applications for the post of

CHIEF DRAUGHTSMAN.

Applicants should have had extensive practical experience in the design, layout and development of multi-motor control boards, particularly as regards equipment built to meet customers' special requirements, and be capable of carrying full responsibility for drawing office output and personnel.

Essential qualities are initiative, ability to organise, and a systematic approach.

Applicants should be between the ages of 30 and 45.

Apply in writing, giving details of age, experience and qualifications, to the Secretary, Morecambe Electrical Equipment Co. Ltd., Westgate Works, Morecambe, Lancs.

3481

CHIEF ELECTRICIAN

PARKE, DAVIS & COMPANY LIMITED

APPLICATIONS are invited for the vacant position of CHIEF ELECTRICIAN. Candidates should be between 30 and 40 years of age, hold at least H.N.C. in Electrical Engineering, and have had a minimum of 3 years' experience in a supervisory capacity, including the control of labour, preferably in the pharmaceutical or chemical industry. The position involves the supervision of a permanent staff of electricians engaged on the maintenance of plant and machinery, the planning of electrical services for new projects, and the control of new installations.

The salary will be commensurate with the responsibility of the position, which is pensionable and covered by a life assurance plan.

Apply in the first instance in writing, giving the fullest possible information of past experience and positions held, to Personnel Manager, Parke, Davis & Company Limited, Staines Road, Hounslow, Middlesex.

367

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER (Construction) based at Llantwit Fardre in the Cardiff and East Central Area of the Board.

Salary Class L, Grade 10 (£995/£1,055) of the N.J.B. Agreement.

Applications, stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments), St. Mellons, Cardiff, so as to reach him not later than Friday, 23rd May, 1958. 3493

CITY OF LIVERPOOL
City Engineer and Surveyor's Department

APPLICATIONS are invited for the appointment of ELECTRICAL ENGINEER, School Maintenance Section. Salary £725-£845 per annum (A.P.T. Grade II).

Applicants should hold the Higher National Certificate in Electrical Engineering and be capable of preparing specifications, schemes and estimates for complete lighting and power installations, and for the modification and improvement of installations in schools, and also supervising the work under construction.

Application form, returnable by 31st May, 1958, can be obtained from the City Engineer and Surveyor, Municipal Buildings, Liverpool, 2.

The appointment is superannuable and subject to the Standing Orders of the City Council. Canvassing disqualifies.

THOMAS ALKER,
(J.5163) Town Clerk. 3410

RESEARCH - DEVELOPMENT
DESIGN - PRODUCTION

WE invite enquiries from Engineers and others who might be interested in joining our staff, at a new works we have in view, to tackle the subject of new products in the domestic electric appliance field.

The salary would be fully in line with education, training, experience and qualifications, details of which should be given in any application. If you have specialised knowledge in any particular branches of this field, this should also be mentioned.

Applications will, of course, be treated confidentially, and should be addressed personally to Mr. C. R. Belling at:—

BELLING & CO. LTD.
Bridge Works, Enfield, Middx.

3428

SIMON-CARVES LTD.

require

(1) AN ELECTRICAL ENGINEER (Ref. FT.41).
(2) AN ELECTRICAL ENGINEER/DRAUGHTSMAN (Ref. FT.42).

whose duties will consist of assisting the Chief Electrical Engineer to design, purchase, install and commission all electrical equipment associated with coal preparation plant, colliery winding engines and substations. Applicants must hold an H.N.C. (Elec.) or the equivalent. Previous experience of mining work desirable but not essential.

These posts are permanent and pensionable. Salary according to experience and qualifications.

Send brief relevant details to Staff and Training Division, Simon-Carves Ltd., Cheadle Heath, Stockport, Cheshire, quoting the appropriate reference.

3439

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER (Maintenance and Substations) in District 346 (Porth) in the Cardiff and East Central Area of the Board.

Salary Class F, Grade 11 (£685/£730) of the N.J.B. Agreement.

Applications, stating age, present position and salary, qualifications, experience, and three referees, should be addressed to Mr. C. L. Townsend, Area Manager, The Hayes, Cardiff, so as to reach him not later than Friday, 23rd May, 1958. 3492

ELECTRICAL ENGINEERS

required for Technical Estimating Department of Automatic Motor Control Gear Makers in West Midlands, following further expansion.

The work comprises of the initial engineering of control schemes, the calculation of their cost and the preparation of tenders.

A pension scheme is in operation and assistance towards removal expenses will be paid in approved cases.

Apply in confidence stating age, experience and salary required to—Box 3379.

Situations Vacant (continued)

TECHNICAL INSTRUCTOR
(Electrical Installation)

required by NIGERIA FEDERAL GOVERNMENT EDUCATION DEPARTMENT on contract for two tours of 18/24 months or three tours of 10/12 months in first instance. Salary in scale (including inducement addition) £834 rising to £1,386 a year, with resettlement grant at rate of £100/£150 a year. Outfit allowance £60. Free passages for officer and wife. Assistance towards children's passages and grant up to £150 annually towards maintenance in U.K. Liberal leave on full salary.

Candidates, who must possess Final C. and G. Cert. in Electrical Installation Work, should have served a full apprenticeship and have subsequent trade experience. Teaching experience an advantage.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/49923/EF. 3476

WEST RIDING COUNTY COUNCIL

Castleford Whitwood Mining and Technical College, Engineering Department

APPLICATIONS are invited for the post of LECTURER in Electrical Engineering to be generally responsible for the electrical course work and laboratories in the College for O.N.C. Electrical Engineering, Mining and Mining Electrical Engineering, General Mining Electrical Engineering, H.N.C. in Mining courses. There is a prospect of an H.N.C. Course in Electrical Engineering in the near future.

Applicants should possess graduate qualifications and have had suitable industrial and lecturing experience.

Salary in accordance with Burnham Technical Report, £1,200 × £30 to £1,350.

Application forms and further particulars obtainable from the Clerk to Governors, 2, Wesley Street, Castleford. 3421

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 2 Sub-Area

ASSISTANT CONSUMERS' ENGINEER required in the Runcorn District. Salary within range £540/£585 per annum (N.J.B. F/14).

Duties of the post will include estimating for contracting work, advising consumers on matters relating to electricity supply, and the utilisation of electrical equipment.

Applicants should have received an engineering training. A technical qualification is desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway House, Northwich, Cheshire. Closing date 28th May, 1958. 3469

SENIOR AND JUNIOR ENGINEERS SENIOR AND JUNIOR DRAUGHTSMEN

VACANCIES exist in the Technical Department for engineers and draughtsmen capable of undertaking research, development, or project control in the fields of electrical energy metering, instrumentation, electronics, or light mechanism applications.

There is considerable scope for initiative in all fields, and generous salaries will be paid to applicants of experience, enterprise and imagination.

Apply to :—

The Technical Manager
ARON ELECTRICITY METER LTD.
72-82, Salusbury Road, London, N.W.6
3427

HASTINGS AND ST. LEONARDS TECHNICAL COLLEGE

ASSISTANT GRADE A (Male) required for Engineering Department, to teach general electrical and mechanical subjects to Final City and Guilds. Ability to help with O.N.C. Electrical Engineering an advantage.

Application forms and further particulars obtainabe from Chief Education Officer, 20, Wellington Square, Hastings, should be returned within 21 days of the appearance of this advertisement. 3471

NATIONAL COAL BOARD

North Eastern Division

ASSISTANT DIVISIONAL ELECTRICAL TESTING ENGINEER required at Doncaster. Salary £675-£1,075 per annum.

The successful applicant will be responsible to the Divisional Electrical Testing Engineer for assisting in the general work of the department and should have experience of the testing, calibration and repair of all types of electricity meters, protective equipment, etc., and the location of faults on underground and overhead power supply networks, and be able to carry out investigations of faults arising out of the use of the various types of mining electrical equipment.

Apply to Staff Director, Holmwood House, Ecclesall Road South, Sheffield, 11, by 23rd May, 1958. Mark envelopes "Staff Vacancy" and quote AA/353. 3411

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division
Vacancy No. 50/ER/58

APPLICATIONS are invited for superannuable N.J.B. appointment of ASSISTANT MAINTENANCE ENGINEER (Electrical) at USKMOUTH POWER STATION.

Salary K.8, £1,065-£1,140 per annum.

Applicants should have had wide experience in power station electrical maintenance and should preferably be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 30th May, 1958. 3461

COUNTY BOROUGH OF BRIGHTON EDUCATION COMMITTEE

BRIGHTON TECHNICAL COLLEGE

REQUIRED for 1st September: ASSISTANT LECTURER GRADE B (with suitable qualifications and industrial and/or teaching experience) to teach Electrical Engineering to Higher National Certificate standard.

Salary scale £650 × £25 to £1,025 (men) plus graduate and training allowances and with increments for approved research, professional or industrial experience.

Further particulars and forms of application from the undersigned, to be returned to the Principal, Brighton Technical College, Brighton, 7, by 27th May, 1958.

W. G. STONE,
Director of Education.
54, Old Steine, Brighton. 3425

BOROUGH OF POOLE

Electrical Engineering Assistant Grade A.T.P.I. £575-£725

APPLICATIONS invited from properly trained electrical engineers (not less than Higher National Certificate standard), who must have design and estimating experience as consumers or contracts engineers, and be capable of supervising works on contract sites. Work will be related to internal and external electrical installations met with in the Council's engineering and architectural branches. Knowledge of street lighting would be an asset.

Application forms and particulars available from Borough Engineer, Poole, returnable to me by 2nd June, 1958.

J. G. HILLIER,
Town Clerk.
3464

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the positions of two GENERAL ASSISTANT ENGINEERS in District 347 (Cardiff East) in the Cardiff and East Central Area of the Board.

Salary Class G, Grade 11 (£740/£785) of the N.J.B. Agreement.

Applications, stating age, present position and salary, qualifications, experience, and three referees, should be addressed to Mr. C. L. Townsend, Area Manager, The Hayes, Cardiff, so as to reach him not later than Friday, 23rd May, 1958. 3491

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 4 Sub-Area

ASSISTANT SECTION ENGINEER (Operation) required at Dolgarrog. Salary within range £740/£785 per annum (N.J.B. E/9).

Applicants should have had experience in the construction and operation of overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date 28th May, 1958. 3470

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of FOREMAN (Substations Section), based at Tenby in the West Wales Area of the Board.

The wages and conditions of service will be in accordance with those provided in the Foremen's Supplement to the N.J.I.C. Agreement, Grade 1, being at present £715 per annum.

Applicants should have experience in the installation and maintenance of H.V. and L.V. plant.

Applications, stating age, qualifications and experience, should be forwarded to Mr. W. E. Richardson, Area Manager, South Beach Pavilion, Tenby, Pembs., so as to reach him not later than Friday, 23rd May, 1958. 3494

NORTH EASTERN ELECTRICITY BOARD

Tees Sub-Area

APPLICATIONS are invited for the appointment of THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER, Stockton District. Salary Schedule A, Class F, Grade 9, £790/£835. N.J.B. conditions of service.

Applications, stating age, qualifications and experience, to be received by the Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 3473

A MANAGER desiring a progressive future required by an electrical wholesaler in Lancashire. Remuneration by salary and commission according to experience. Superannuation scheme.—Box 3441.

ASSISTANT electrical engineer required by steel tube manufacturers in Birmingham. This is an excellent opportunity for a young man who is between the ages of 25 and 32, who has a university degree or its equivalent, and has served a recognised apprenticeship or training for at least 3 years in electrical engineering. The successful applicant will be responsible to the asst. chief engineer for all the electrical maintenance and repairs of a varied plant including a large number of overhead cranes and other lifting appliances. Apply stating age, qualifications, experience and salary required to Personnel Manager, Tubes Limited, Rocky Lane, Aston, Birmingham, 6. 3442

ASSISTANT manager with mechanical/electrical experience to boost production established West London component factory with full order book. Excellent prospects hard worker with ideas and ambition. State age, experience, salary required.—Box 3430.

AUTOPHONE Ltd. require design draughtsman capable of assisting in developing automatic and loudspeaking telephone equipment. Ability to write technical descriptions of advantage. Please apply in writing to 539, Wandsworth Road, London, S.W.8, stating age, experience and salary required. 3443

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., 24, Fennel St., Manchester, 4. Electrical surveyor required for a vacancy in Great Britain. Permanent position carrying progressive salary scale £735 to £1,060 and non-contributory pension. Candidates, age 26 to 32, preferably with H.N.C. in Electrical Engineering or Grad. I.E.E., and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply in own handwriting, stating age, qualifications and experience. 3453

CONTROL gear engineer required, age 23-35, for layout and circuiting of contactor equipment. Good salary. Permanent and progressive position. Canteen, pension scheme. Write stating age, experience and qualifications, if any, to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 273

DESIGN engineer required for electrical automatic and hand control gear. Must have knowledge of electronics. Progressive position; substantial salary; superannuation.—Box 3272.

DESIGNER-draughtsman, senior, electrical, required. Experience is preferred in the application of diesel-driven generating machinery up to 200 kW and its associated control gear, including portable, standby, automatic mains failure equipment, etc. Experience essential in control gear and circuit layout. Good salary offered. Pension scheme. Canteen facilities. Reply for the attention of the Chief Engineer, Henry Meadows Limited, Fallings Park, Wolverhampton. 3241

DRAUGHTSMEN, both senior and junior required. Applicants should have either contract development or diagram experience on switchgear up to 11 kV, although men with good electrical or mechanical knowledge will be considered. Excellent working conditions. Good prospects. 5-day week. Superannuation fund. Interviews arranged Saturdays if desired. Apply giving full details of training and experience to Personnel Officer, Crompton Parkinson (Chelmsford) Limited, Chelmsford, Essex. 368

DRAUGHTSMEN required for contracts office dealing with airbreak and oilbreak medium voltage switchgear. Previous experience of motor control switchboards would be an advantage. Superannuation and staff bonus schemes. Possible assistance with housing to selected applicants. The company is in a rural district within six miles of the coast. Write stating previous experience, age, etc., quoting ref. CO/2, to—Ottermill Switchgear Ltd., Ottery St. Mary, Devon. 3311

DRAUGHTSMEN reqd. with experience in preparation of cable layouts and installations for generating stations, industrial plants and distribution schemes. Write giving full details of experience, qualifications and salary reqd. to Staff Officer, Ref. 744/8, Siemens Edison Swan Ltd., Woolwich, London, S.E.18. 3412

ELECTRICAL contract engineers. Opportunity for two young engineers to join staff of progressive company, one for electrical distribution and allied contracts, and one for internal work. Write giving full details, experience and age.—Box 3496.

ELECTRICAL contractor, London, W.1, offers progressive position to working foreman electrician. Good tradesman, and driving licence essential. Capable of supervising labour and industrial contracts. Details of age, training and experience to—Box 3414.

ELECTRICAL contractors require senior engineer as assistant manager. Will be required to estimate, supervise and bill all types of installations. Must be known and have connections in South Lancashire. State age, details of previous employment and salary earned. The situation has prospects and carries salary, bonus, pension and car.—Box 3392.

ELECTRICAL engineer representative required by provincial electrical installation contractors to develop, expand and take charge of existing London office. Must be fully qualified for such, know the London area thoroughly, and be able to introduce new business from architects, consultants, large industrial concerns, etc. Reply in confidence, giving full particulars, age, permanent address, salary wanted, to—Box 3352.

ELECTRICAL engineer required with extensive experience in maintenance, supervision and installation of quarry, tarmacadam and concrete batching plant.—Box 9363.

ELECTRICAL installation engineers require supervisor for West Africa. 18 months tour, 3 months' leave. Free accommodation, kit allowance and passage, single man preferred. Apply stating salary required.—Box 3394.

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 275

ELECTRICAL wholesalers require young men, 16 years upwards, to train as storekeepers with a view to becoming order clerks.—Halsey's Electric Co. Ltd., Brandon House, Wyfold Road, London, S.W.6. 3483

EXPORT engineering buyer, age 26-35, required by well-known city firm. Previous buying experience preferably including alternators, motors and switchgear. Certificates an advantage. Annual bonus out of profits and provident fund. Full details to—Box 3484.

FOREMAN. Electrical manufacturers, East Lancs. Experience of assembly and wiring of control gear necessary. Knowledge of sheet metal work and light machining an advantage. Good disciplinarian required. Assistance with housing.—Box 3444.

INSTALLATION contractors' estimating engineer for London office. Good experience and organising ability essential. Full details and salary required to—Box 9365.

INSTALLATION engineers, senior and junior, with estimating and/or supervising experience. Progressive opportunities. Apply in confidence to Managing Director, Troughton & Young Ltd., 2, Basil Street, London, S.W.3. 3354

J. A. CRABTREE & Co. Ltd., Walsall, require senior designers with experience in domestic and industrial electrical accessory development. Applicants should be capable of initiating detail development with a minimum of supervision. Applications stating age, experience and salary required should be addressed to the Technical Director, Lincoln Works. 3313

LEE GUINNESS Ltd. offer unique opportunity to senior technical representatives with experience in the field of automatic contactor type control gear to form the nucleus of a national sales organisation. The appointments at present under consideration are for the London, Birmingham and Manchester areas and will offer great scope for rapid promotion to men with the ability and enthusiasm to help in building a first-class team. A generous salary will be paid, with excellent prospects of advancement. A pension scheme is in operation. Apply, giving details of age, experience, present and expected salary, to — General Manager, Lee Guinness Ltd., Newtownards, Co. Down, N.I. 9362

MANAGER for electrical repair shop, East Lancs. Must be familiar with all types and sizes, A.C. and D.C. Accommodation available.—Box 3325.

MANAGER for stores dept. of electrical wholesalers 20 miles north-west of London. Successful applicant, who should have thorough knowledge of electrical wholesale trade, would control all sections of stores, including purchasing, stock control, trade counter, receipt and despatch. Apply in writing giving details of experience, etc., to—Box 3418.

MANUFACTURERS of decorative electric light fittings, glassware, etc., require experienced representative to take over and expand 25 years' old connection in 6 northern English counties.—Heywoodhill Ltd., 19, Hamstead Rd., Birmingham, 19. 9364

REPRESENTATIVE. Sales engineer required in the Yorkshire area by well-known company manufacturing a range of cookers and home appliances. A young man with a connection with the Y.E.B., N.E.E.B., wholesale and retail electrical trade, can make this an excellent career. The possession of a car will be an advantage. Write giving full details of education, training and posts held to Manager.—Box 3431.

SALES engineer required, capable of preparing estimates and tenders for L.V. switchgear and distribution equipment. Superannuation scheme, canteen facilities, 5-day week. Write giving age, experience and salary required to the Secretary, W. Lucy & Co. Ltd., Eagle Ironworks, Oxford. 3355

SENIOR cable estimator required by Hackbridge Cable Co. Ltd., Hackbridge, Surrey. Must be fully conversant with estimating and design for paper rubber and thermoplastic cables. Pensionable post. Write stating age, experience and salary required. For the attention of the General Sales Manager. 3419

TECHNICAL estimator required for responsible position in small electrical manufacturing unit in North London dealing with a range of medium duty switchgear, switchboards, sheet metal work, etc. Experience of shop floor techniques and customer contact advantageous, together with qualifications to Higher National Certificate standard. Attractive salary and pension scheme.—Box 3290.

SUPERVISING engineer required by large London contractors, must have sound knowledge of heavy industrial projects. Capable of handling site technical and labour problems and prepared to live away. Good rates for right man.—Box 3408.

TECHNICAL assistant to designer required (age 20/28). Should have some acquaintance with design of automatic electric motor control gear, also electronic and magnetic amplifiers. Progressive position, attractive salary, superannuation.—Box 3271.

TELEPHONE cable engineers. Vacancies exist for overseas contracts for telephone cable engineers experienced in the planning and development of subscribers' network schemes. Also contract engineers to undertake installation of u/g and o/h cable systems. Permanent pensionable staff appointments. Write with full details in confidence, stating age, experience and salary expected in U.K., to Staff Officer, Ref. 744/9, Siemens Edison Swan Ltd., Woolwich, London, S.E.18. 3413

TELEPHONE engineer required in Bermuda, age about 35 years, preferably A.M.I.E.E. or equivalent, to assist the chief engineer planning and technical assistance, system 10,000 telephones, also familiar equipment engineering main exchange and private automatic installations. Knowledge rotary system advantage. Salary £2,000, passages paid, contract 3 years renewable, and prospect permanency. Write personal particulars and professional experience to Robert Tucker & Co., 23, Coleman Street, London, E.C.2, who can supply local information concerning Bermuda. 3445

TYRAD ELECTRIC Limited require a technical assistant for design work on electric space heating installations. Applicant should have a knowledge of heat loss calculations and be a competent draughtsman. Write stating age, salary required and previous experience to—Staff Adviser, 2, Basil Street, London, S.W.3. 3485

VACANCY occurs for trained electrical engineer having industrial test bed and winding experience together with sufficient technical knowledge to make, purchase or redesign suitable equipment to meet industrial enquiries and orders. These relate, for the most part, to rotating electrical machinery, transformers, switchboards, etc. Good salary and opportunity in small progressive firm. Write the Secretary, Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts. 3486

WELL-known electric winding wire and strip manufacturer requires senior representative with knowledge trade, Birmingham, Midland counties. Write in first instance giving details experience. Own employees have been advised.—Box 3446.

WORKING foremen required by electrical contractors, London, W.C. area. Work mainly London. Good prospects. All London applicants interviewed.—Box 9356.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ELECTRICAL engineer, A.M.I.E.E. (37), family man. Last 11 years as test engineer in supply industry, present rem. £1,200 p.a. Position wanted in any organisation offering employment in Canada.—Box 9367.

ELECT./mech. engineer, 36 years old, 20 years' general engineering experience, last 13 in East with considerable managerial experience, desires post U.K./overseas where courage, initiative and hard work can provide minimum salary of £1,250 per annum.—Box 9359.

ENGINEER, wide experience contracting, installation design, site supervision, A.M., factory, brewery, cement plant and quarry maintenance.—Box 9348.

EXPERIENCED mechanism assembler and inspector of sin-cos, fixed charge, timing units and prepayment meters seeks change.—Box 9361.

REPRESENTATIVE, good connections with industrial, contractor and retail customers, desires change. East London/Essex area; wholesaler or manufacturer.—Box 9351.

YOUNG electrician with wide experience contracting and maintenance seeks overseas employment.—Box 9366.

ARTICLES FOR SALE

NEW OXFORD TRANSFORMER WELDERS
for Immediate Delivery

160/450-amp. sizes, oil-cooled pattern for operation on 400/440-v., single-phase, or 200/240-v., dual welding voltage 50/80; in-built coarse and fine regulators.

Prices as follows :—

450 amps.,	£135	0	0
350 amps.,	£99	10	0
250 amps.,	£71	0	0
180 amps.,	£45	0	0

GEORGE COHEN SONS & CO. LTD.
Wood Lane, London, W.12
(Tel. Shepherds Bush 2070) and
Stanningley, Nr. Leeds
(Tel. Pudsey 2241) 3293

ELECTRIC MOTORS FOR SALE

150-h.p. Synchronous Motor by E.C.C., 400/440-3-50, 1,000 r.p.m., with control panel.

Four 90-h.p. BRUSH Slipring Motors, 400/440-3-50, 1,460 r.p.m., with o.i. starters.

45-h.p. BROOK S.C. Motor, 440-3-50, 410 r.p.m., with o.i. star delta starter.

Five 200-h.p. E.C.C. 500-volt D.C. Motors, 425 r.p.m., with BROOKHIRST panels.

120-h.p. MET-VICK, 500-volt D.C. Motor, 500/700 r.p.m., with starter.

45-h.p. MET-VICK. 500-volt D.C. Variable Speed Motor, 500/1,000 r.p.m., with starter.

REED BROTHERS (ENGINEERING) LTD.
Replant Works, Woolwich Industrial Estate
London, S.E.18
(Telephone : Woolwich 7611/6) 3454

D.C. MOTOR STARTERS

H.P.	Voltage.	Maker.	Remarks.
375	200/220	MET-VICK.	Automatic
240	220	ALLEN	Drum
225	250	BROOKHIRST	M.L.
195	220	IGRANIC	Automatic
150	500	BROOKHIRST	Drum
110	220	ALLEN WEST	Drum

Other starters available, all sizes.

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Wood Lane, London W.12
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Stanningley, Nr. Leeds
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ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 101

MOTOR STARTERS FOR SALE

AUTETTE Push Button Starters (unused) by ELECTRICAL APPARATUS Co. Ltd., to B.S. 587/40, for three-phase fractional horse-power motors up to and including ½ h.p., 380/440 volts.

New 237, Soiled 389, a total of 626. Cost per unit to cover both lots, 17s. 6d. each.—Box 3447

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W.4. 57

BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard : Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ARMATURE or enamelling drying ovens (2), 6' cube, ex Ministry, in serviceable condition. Any reasonable offer to clear.—Cox-Walkers Ltd., Feethams, Darlington. 3398

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists. — Batt Electrical Co., 6, Duck Street, London, E.1 (Tel. ROYal 5905). 316

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24, 110 and 220v. D.C. to 230/1/50 A.C., 125 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

D.C. to A.C. rotaries, 10, 5 and 2 kW, for sale. Particulars on application.—Box 3420

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

FLAMEPROOF switchgear, lighting fittings, conduit fittings, motors, etc., always in stock. —Leighton Warehouse Co., 6, Church Road, Linslade, Leighton Buzzard, Beds. (Tel. No. L.B. 3400). 9341

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

G.E.C. amplifier equipment complete with radio unit, gramophone turntable and pick-up, and amplifier consisting of 2 DA 100 valves in final stage. Contained in 6-ft. steel rack and capable of supplying 60 speakers. Complete with 35 speakers. Offers to—P.R.I., 68th Regt. R.A., Park Hall Camp, Oswestry, Salop. 3416

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plant, 230 volts D.C., for sale. 168-h.p. vertical diesel engine driving a B.T.H. 160-kW generator. Complete plant, with starting and cooling equipment. Control board, fuel tank. Illustration and details from F. J. Edwards Limited, 359, Euston Road, London, N.W.1. 3415

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc.—Powerco Ltd., 312, York Rd., London S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW. A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 5 amps., 17s. 6d.; 18. 6d. postage.—Universal Electrical, 217-221, City Rd., London, E.C.1. 37

MERCURY. We supply clean mercury (lab. grade) for commercial and industrial use. Price 25s. lb. All distilled grades stocked. Generous allowance for dirty mercury. We also buy scrap platinum, gold, silver (in any form) at top market prices. — Belgrave Ltd. (E.R.), 5, Belgrave Gdns., London, N.W.8 (MAI. 7513). 3432

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS, starters, circuit breakers. Huge stocks of all types, ½ to 300 h.p. Stock list or quote by return.—J. S. Ramsbottom & Co. Ltd., Bow St., Keighley (3774-5-6). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings. 57s. 6d. each subject. — F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY Credit Meters, single & poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

SMALL BR screws and nuts in steel, brass and stainless steel, from stock. — Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

TELEVISION slotmeters & Time Switches. Details from : Tradex Meter Co., Surbiton. Elmbridge 4487. 172

TWO nearly new 350/400-kVA condensing geared steam turbo sets, 150/200 lb. pressure, stainless blading, self-contained condensers, 400 volts, 3-phase, 50 cycles, and control equipment. Standby sets, never put into commission.—Box 3455.

TWO Young's "Tower" welding sets, 240 v., 4.5 kVA, 50/150 amps., £25 ea.—W. Steel & Co. Ltd., Palmers Road, London, E.2. 3369

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WELDING transformer by English Electric, 36 kVA, type FWC600.—Thomas Mitchell & Sons Limited, Bolton. 3452

110-volt electrical system, 15-h.p. Turner diesel, 6-kW dynamo, switchboard self starter and 54-cell storage battery. What offers? — Stone House, Rogate, Petersfield, Hants (Rogate 60). 3449

329-kVA alternator by English Electric, 3/50/400 volts, 1,000 revs., single bearing machine suitable for direct coupling.—Thomas Mitchell & Sons Ltd., Bolton. 3451

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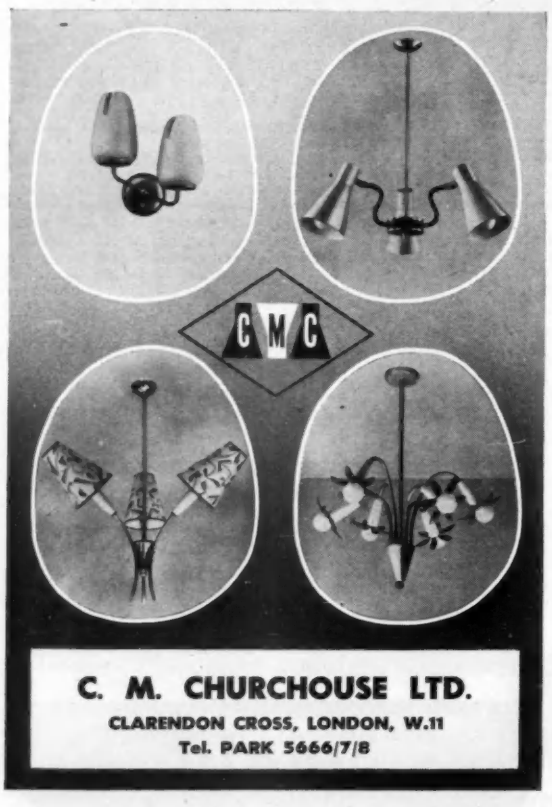

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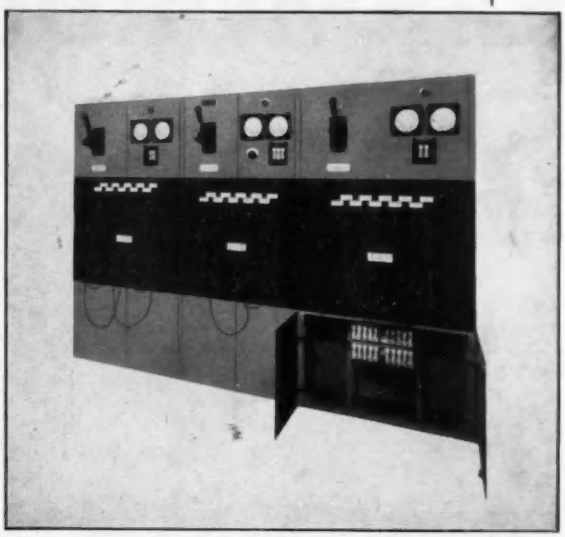

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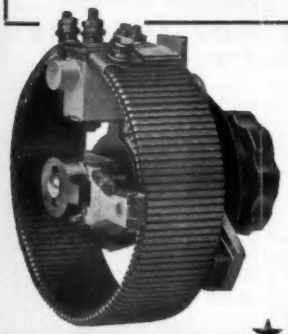

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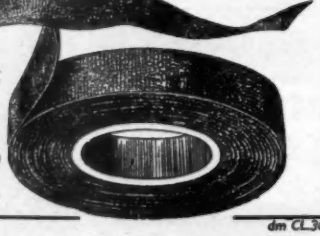

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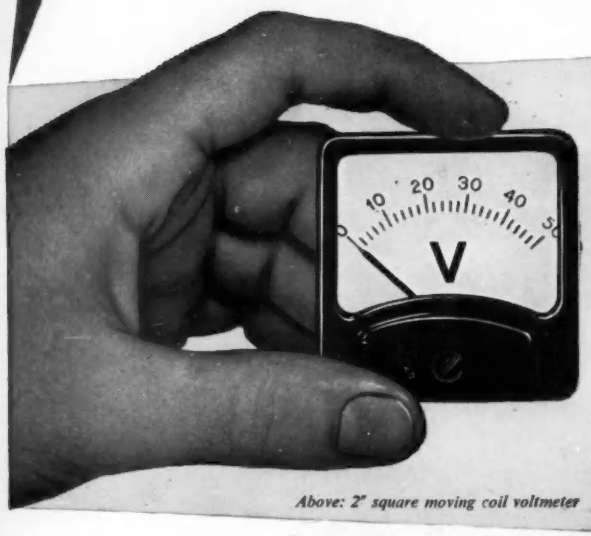

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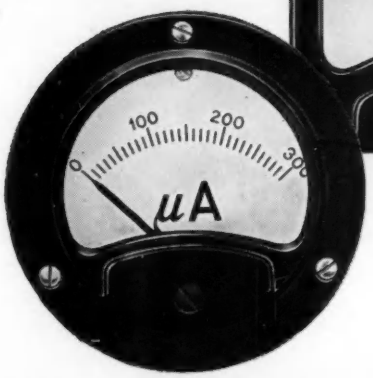

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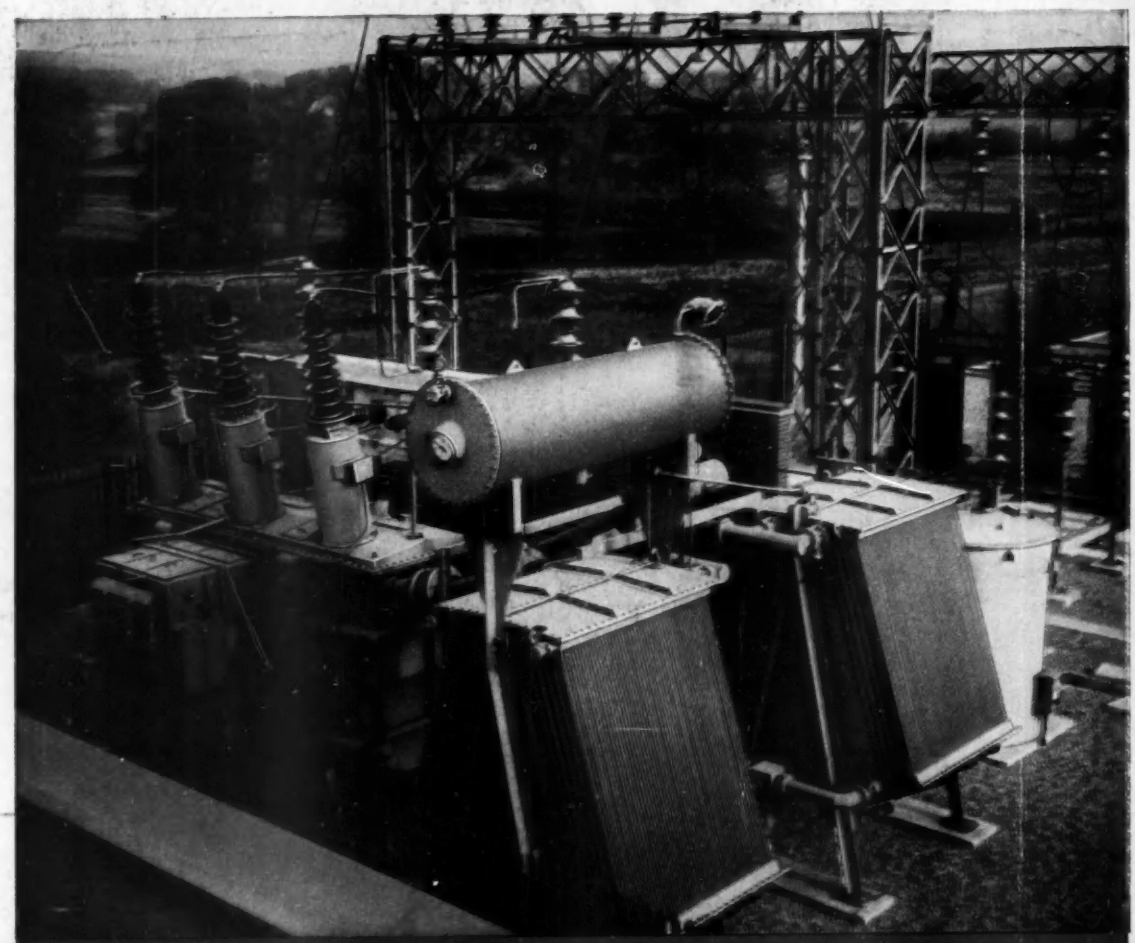

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